THE VETERINARY JOURNAL

AND

Annals of Comparative Pathology.

DECEMBER, 1899.

Editorial.

OUR NEW YEAR PLANS.

OUR January issue will assume a different form of sheet, and will be in many ways improved, so as to attract the eyes of our readers. In addition to this, we purpose sending a copy of our first number for 1900 to every veterinary surgeon in Great Britain who is duly registered as a practitioner. In so doing we hope not only to extend the circulation of the Journal—which would be in itself a source of great pride and satisfaction to editors and publishers—but we desire mainly to help towards the federation of the profession. We are a comparatively small profession as yet, and our voice is not very loud and it is seldom heard, but we have the possibilities of a great future, we are destined for important work; only we must gird up our loins, and that quickly, if we wish to accomplish that work and rise to the high position which we hope and believe we deserve. If there is any fatal doctrine in the world it is letting things slide. "Except these abide in the ship," said the great Apostle, "ye cannot be saved." This might be taken as a maxim by many people, but most especially by such a body as ourselves. The great preacher had a conviction, based on a presentiment, that the whole crew of the vessel and all the passengers on board would be saved from shipwreck and death, but even in his exalted state his prudence and common-sense did not desert him. He knew that Providence works its designs through human agency, and he had learnt the value of individual effort. So must it be with us; there must be no folding of hands and going to sleep, but there must be constant effort and constant watchfulness.

We trust that when our January issue comes into the hands of new readers they will pass it on to some friend interested

in veterinary affairs, and likely to become a subscriber, or that they will send it abroad. In these days, when Imperial Federation is the watchword of the British citizen, and when every man and woman in the country has a more or less profound interest in our Colonial Empire, when every one of us has a brother or nephew or cousin in the lands beyond the sea, it ought not to be difficult to find eager readers for our Journal in the Colonies—men and women who will be only too pleased to learn that there are journals devoted to the things that interest them. Postage is cheap now, and therefore we trust that each recipient of the January number will sacrifice a penny or two and so aid us in spreading abroad the light of science. Our own labour throughout the year is largely a labour of love; if we had no regard for scientific truth and no desire to help those who are in need of help, if we were influenced by purely mercenary considerations, we should be grievously disappointed at the balancing of our yearly accounts. But there is a charm in coming every month into contact, even through the dead symbols of print and paper, with our fellow-men, and one cannot help feeling a thrill when one thinks that one's words may be read by thousands of readers. And this, we maintain, is apart altogether from financial considerations. Let our readers, the old and the new, share this pleasant feeling. Let them send us from time to time notes of interesting cases that come under their notice, or let them give utterance to their thoughts on any subject that concerns the veterinary profession. We shall be pleased to receive and consider all such communications, and to find a corner for them in the Journal, if we can. Nothing is more gratifying to us as practitioners than to have a quiet talk with a professional brother, however young or however old, whether living in a remote village or a huge centre of population. They all talk in an interesting way: why don't they write to us? We shall return to this subject next month in our preface to the new issue; meanwhile, we commend it to our fellow-practitioners and all our good friends for their careful and kind consideration.

"UNDER WHICH KING, BESONIAN? SPEAK OR DIE!"

One feels inclined to use these words of Ancient Pistol when one reads the *Veterinary Record*. To-day we find it staunchly supporting the profession and the schools; to-morrow we may find it wavering in its allegiance. It is certainly

desirable to do justice to the enemy's claims, for thereby only can a clear issue be laid before the public and war be justified, but a true soldier must fight either on the one side or the other. Only mercenaries fight on each side alternately, and that kind of fighting is supposed to have died with the Middle Ages, so far as warfare on the field is concerned. We trust it is not going to be revived in journalism. In its editorial for 25th November, the *Record* fights valiantly for the veterinary profession—we hope from sincere convictions and not by accident. The whole article might have appeared as a leader in THE VETERINARY JOURNAL, and might be transferred to our pages, were it not that the *Record* is so widely read. We trust every veterinary surgeon in the country, and especially every member of the R.C.V.S., will read and carefully assimilate No. 594. The article is headed "Tuberculous Udders," and shows the dangers to which consumers of milk—that is, all the people of the country—are exposed through this disorder. The *Record* says very wisely, "it ought not to be impossible to prevent this danger," but "very little is done by local authorities" to prevent it. When efforts *are* made, "the principles of local government are strained"—and this is sufficiently alarming; therefore, "what is required is some legislation which provides (? shall provide) uniform and general regulations." Then we find the triumphantly loyal declaration—"Of course this would necessitate the appointment of proper officers as inspectors, and no person could act efficiently except a veterinary surgeon." Next we are told that "perhaps out of the 400 existing local authorities not 10 have appointed an inspector capable of recognising tuberculous udders." We hope our professional brethren will not read this aloud to their wives—the panic would be too awful. But worse is to follow: "Laws of this kind are a farce—they pretend to afford protection, whilst really blinding the public to a danger." Our brethren must, we implore them, not leave the *Record* (No. 594) lying about; they must commit the article to memory and burn the paper.

We rub our eyes as we read the next sentence, written, be it remembered, by the proposed chief of the Sanitary Institute: "The sanitary inspector . . . knows nothing of animal diseases. For his own special work the sanitary inspector is a good official, but for detecting special diseases in animals he is useless. His superior, the medical officer of health, is equally inefficient in diagnosing diseases in animals." What a thought for a patriotic citizen! Then comes

the refrain: "The danger can only be removed by every local authority appointing a qualified veterinary surgeon as inspector." This is excellent, and we ought all to be grateful to the *Record* for its vigorous defence of the profession. But it might have made a still better case. Tuberculosis of the udder is a dangerous disease, but there are others of equal virulence. What of actinomycosis of the mammary gland, which resembles it so much, yet presents different symptoms, and is so difficult to distinguish? Let us suppose that a sanitary inspector is drilled into a capacity for diagnosing tuberculosis in the udder as being a common disease; he is puzzled some day with phenomena which do not accord with his instructions, his rule of thumb fails him; is he to pass the animal as sound, though suffering from actinomycosis, or is he to go, like a big baby, to the nearest veterinary surgeon for advice? We should be inclined in such a case to send him—say to Jericho. The whole thing is too ridiculous.

We might also ask what are the relations to be between the offspring of the Sanitary Institute and the Contagious Diseases (Animals) Inspectors? A thousand difficulties will arise from this attempt to manufacture cheap inspectors. Cows will be passed as sound which are reeking with diseases, and others, suffering from nothing more serious than "deaf quarters," will be condemned and sent to the slaughter-house. The loss to the nation in both cases will be serious: in the one case our health will suffer, in the other our pocket, and that severely. Whether we view this matter from the scientific or the economic side, we see only one way of escape from a terrible difficulty. For the work of milk and meat inspection, and all kindred work, "no person can act efficiently except a veterinary surgeon."

CULTURE *versus* CASH.

OUR excellent friend, the editor of the *North British Agriculturist*, essays in a recent number of his paper (8th November) to break a lance in defence of the veterinary colleges. We have the greatest possible respect for the *North British Agriculturist*, which is a most influential journal, and is widely read not only in Scotland but in England. It has supported our profession most valiantly on more than one occasion, and we consider that everything which it says deserves our respectful consideration. In this issue for 8th November there are two articles on veterinary

colleges, which are kindly meant, but one of which is slightly, and unintentionally, misleading. We refer to the latter one, and with it we feel somewhat dissatisfied. Dealing with the falling off in the number of veterinary students, the editor attributes it partly to the lengthening of the course of instruction, but mainly to the stringency of the preliminary examinations. He goes farther, and is inclined to impute unworthy motives to the Council of the Royal College of Veterinary Surgeons.

Our main point of dispute with the editor of the *North British* is his attribution of unworthy motives to the Council of the R.C.V.S. We do not think it is true that the Council wishes to exclude competitors by the imposition of over-severe examinations. No doubt men are selfish animals. We hope the railway train will wait till we arrive and are comfortably seated, and then we hope it will start before anybody else comes to disturb our comfort. But the members of the R.C.V.S. are not so short-sighted or so selfish as is supposed. They are quite alive to the danger of an influx of "unqualified men with their quack nostrums"; they are anxious to protect the interests of the stock-owner; they, quite naturally, wish their sons to be better men than themselves; they have no pecuniary interest in any veterinary college; very many of them regard one or other of the colleges in London, Edinburgh or Glasgow, as their *alma mater*, and have a feeling of affection and filial respect for their old college. Only, with that affection and that respect is mingled a feeling of pride and of jealousy for the honour of the old place and the old teachers; they will not allow the Philistine to step into their heritage and defile it with his vulgar presence. In plain words, they see that as science, and especially medical science, extends its boundaries, so must the intrusion of the charlatan be gradually, and by repeated efforts, rendered impossible; to admit him to any share of power is to hasten dissolution and decay; to recognise his right to existence is not only, in these modern days, an act of treachery and unfaithfulness to truth, it is an absurdity; as Lord Beaconsfield would have said, it is not only a crime but a blunder.

It may be objected that to talk thus is to attribute too lofty and too magnanimous motives to the Council of the R.C.V.S. The best disproof of such an allegation is to state that, as teachers, we quite agree with the Council and its decisions. We do not, as we have said, believe these decisions to be the outcome of selfishness or greed. We believe them to be

dictated by wisdom and common-sense, as well as by zeal for professional reputation; anyhow, we agree with them, and when a man speaks against his immediate pecuniary interests, he may be regarded as being terribly in earnest. It will, perhaps, be answered that in acting and talking thus we are not unselfish but merely crafty; that our apparent zeal is but enlightened self-interest, and that we hope in the end to gain our purpose. Be it so; we do not pretend to be heroes or martyrs, but we do claim to have the courage of our opinions, and we are content to wait the fulfilment of our predictions. We sow the good seed in full assurance of an abundant harvest; we cannot tell who will reap, whether we or they who come after us, but we know that there will be a harvest, and we are satisfied with that certainty.

It may be that the Council of the R.C.V.S. is too severe in exacting that the whole preliminary examination shall be passed at one time. This is a matter of detail regarding which even friends may be allowed to differ, but we do not object to the matter or the manner of the examinations. But surely at this late hour in the nineteenth century we do not require to vindicate the claims of at least an elementary training in the principles of language—that subtle medium of thought best obtained by a study of the dignified and harmonious tongue of those who were, in much that is spiritual and more that is intellectual, our direct ancestors. A knowledge of Latin is easily acquired, every plain country school teaches it; the shepherd lad and the shop boy are none the worse but all the better for having even a smattering of Latin as a key to the mysteries of English spelling; they will never have any difficulty as to the spelling of separate—that crux of the uneducated. How much more important is it for the youth embarking on the humblest professional career to be able to take to pieces, so to speak, such words as *dyspnœa*, *splanchnology*, *dysmenorrhœa*, *putrescent*, *follicle*, *pedunculate*—words which he will constantly meet and which are certain to be enigmatical to him unless he knows a little Greek and a little Latin. This is altogether apart from the disciplinary effect of a regular and methodical study of linguistic laws. Further, the animal body is a marvel of mechanical contrivance, of the adaptation of means to an end, and therefore an elementary knowledge of physics is all-important as a preliminary study. Finally all medicine presupposes a knowledge of our mother tongue and ability to write it correctly and easily. Nothing is more wearisome or more hopeless than the teaching of the dull clod-hopper,

who is beset by prejudice and persists in taking the wrong meaning out of words. A teacher of medical science is an architect, who indicates how the edifice is to be constructed; if he has to hew the stones and plane the wood his task is not only endless, it is impossible.

The *North British Agriculturist* must not decry "the ideas and discoveries of French and continental writers in veterinary science." In the scientific world there is no distinction of nationalities, and perhaps this is one of the great advantages of the scientific career. The mind of the student is braced and elevated by the enormous extension of his horizon. He rises above petty insular or parochial jealousies, he comes to breathe a purer atmosphere, and realises the great truth that the Almighty is no respecter of persons. We make it a feature of THE VETERINARY JOURNAL to frequently bring before our readers the results of the best continental thought, and we trust our readers appreciate our translations and get benefit from them.

As we have said on former occasions, it is not a lowering of our standard of culture, general or scientific, that is wanted, but rather a raising of it. Teachers in veterinary schools might increase enormously their incomes if the standard of the preliminary examinations were reduced; some institutions might be saved from impending bankruptcy, but the policy would be suicidal. Our stockowners would speedily perceive that increase in numbers meant deterioration in quality, that instead of trustworthy advisers they had obtained mere charlatans, plausible quacks; and so the last state of our profession would be worse than the first. The only cure for our evils is the assistance of a paternal Government. Our great statesmen are all interested in agriculture and stock-breeding. Royalty itself is our patron, our genial Prince is the very king of farmers. Shall we live to see the day when the Prince of Wales Veterinary College, splendidly equipped and manned with all the talent of the country, shall be one of our national institutions, the glory of Britain and the envy and admiration of the whole world?

THE *VETERINARY RECORD* AND MEAT INSPECTION.

A most surprising result has followed from our editorial of November. The *Record* is speechless. We really did not mean to hit so hard, and are sorry if we have been too severe.

The editor rather astonishes us. He writes with a most facile pen, and can as a rule give a good account of himself, but this time his fluency has deserted him. He seems to say, "I can't answer you, but I'll fight you for it." Is this quite consistent with editorial dignity? Has the editor of the *Record* any right to change the venue of the trial of strength? We think not. In a verbal debate, whilst admiring his dialectic skill, we are prepared to dispute with him and take our chance but in a literary contest, provoked by himself, we choose to abide by literary methods. We invite attack, we are prepared for defence; the warfare is journalistic, let it remain so.

MALIGNANT MALARIAL FEVER OF THE DOG.

BY DUNCAN HUTCHEON, CHIEF VETERINARY SURGEON CAPE OF GOOD HOPE.

THIS is the disease which I have hitherto described as malignant jaundice, or bilious fever of the dog. It is the most fatal form of disease affecting dogs in this colony. About 15 years ago it was confined chiefly to the eastern coast districts, but it is now met with all over the colony and adjoining States, principally along the main lines of traffic. I first encountered it at Port Elizabeth in 1885; up to that date it had generally been considered a form of distemper, but although it may be associated with that canine malady, it is perfectly distinct from it in its origin and character.

In writing about this disease in 1893, *vide Agricultural Journal*, vol. vi., No. 24, p. 476, I remark, with respect to the nature of the disease, that its pathology has not been very clearly worked out yet, but it appears to be a special fever in which the blood becomes disorganized, and the blood corpuscles broken up, thus setting free their colouring matter, which appears in the urine. The jaundice appears to have the same origin, accompanied by derangement of the secreting function of the liver. There is ordinarily no serious obstruction to the flow of bile from the bile ducts, and the *post-mortem* appearance of the liver is not often sufficient by itself to account for the deep jaundiced tint of the tissues and the dark brown colour of the urine, which are the prominent symptoms in this disease. The disease bears a very close resemblance to the red-water of cattle, which is understood to be due to a micro-organism which grows and multiplies in the blood corpuscles, breaking them up and setting free their colouring matter, which escapes in the urine; the accompanying derangement of the liver and the jaundiced

tint of the tissues are secondary effects, which in many cases are entirely absent.

Since that time more pressing work has engaged the attention of the veterinary staff, but recently, through the kindness of the sanitary department of the Town Council of Cape Town, who have placed at our disposal a few stray unclaimed dogs, these have been used for the purpose of determining how the disease is communicated. These experiments have been conducted by Veterinary Surgeon Spreull, and, without going into details at the present stage of the experiments, he finds that the disease is readily communicated to a healthy dog by the injection of a small quantity of blood drawn from an affected animal, either subcutaneously or intravenously. When the injection is made subcutaneously the temperature begins to rise about the sixth day, but when made intravenously the temperature rises on the fourth day, and death takes place on the eleventh and seventh days respectively after the inoculation. Meantime a specimen of the blood was forwarded to Dr. Carrington Purvis, Acting Director of the Bacteriological Institute, Grahamstown, for examination, and the following is his report:—I have to thank you for the blood of a dog (suffering from malignant jaundice), sent in a preservative liquid. I have carefully examined the blood, and find that it contains:—

(1.) Bacilli (no doubt extraneous).

(2.) *Organisms* (usually one to two in number) inside many of the red blood corpuscles. (The diagrams represent these organisms as similar to those present in Texas fever in cattle.)

(3.) Rounded or ovoid organisms inside what appear to be white corpuscles (but no nucleus could be made out); these corpuscles may be greatly enlarged red corpuscles. He adds: If these be really white corpuscles, they have evidently swallowed some of the parasites.

Post-mortem appearances.—The *post-mortem* lesions in those cases which are produced artificially by inoculation are identical in appearance with those in which the disease is contracted spontaneously, and are briefly as follows:—There are ecchymosed spots varying in number around the heart, and in large numbers in the left ventricle, and in many cases the pericardium contains a variable quantity of a serous fluid. The lungs are rarely affected, but in some instances a quantity of a brownish-coloured serous fluid has been found in the thorax. A similar fluid has been found in the abdominal cavity.

The liver in the majority of cases is more or less congested, and in individual cases that organ is acutely inflamed and varies in appearance from a mahogany colour to a deep saffron hue. The bile is generally of a very dark green colour, and thicker than natural. The spleen is much enlarged and congested: in one small fox terrier it weighed 18 drams. The fundus or sac of the stomach is generally inflamed, but the pyloric end is normal, and occasionally a few small spots like ulcers may be observed on the rugæ of the stomach. There is catarrhal inflammation of the small intestines, the inflammation being more intense about the duodenum. The lumen of the bowel contains a quantity of viscid mucus, often mixed with blood. The large intestines are also slightly inflamed but not uniformly; they also contain much viscid mucus. The kidneys are more or less congested, sometimes œdematous, and the cortex of a dark brown colour. The urinary bladder appears healthy, but the urine is generally of a dark brown colour like pontac.

In some cases the tissues throughout the body present a yellow jaundiced tint.

Symptoms.—In the cases artificially produced by inoculation the temperature begins to rise about two days, in some cases more, before the visible symptoms become manifest. The first visible symptom is dulness, the dog lies about more than usual, and does not care much for his food, although he may eat a little when it is placed before him; very soon he refuses food altogether, but manifests a great craving for water, and will drink large quantities, if he has free access to it. It is seldom, however, that he can be induced to take even a little milk along with it. In some cases vomiting is an early symptom, but in many cases it is not observed except when food is forced down the patient's throat, when the stomach invariably rejects it. The urine becomes dark red in colour, and the gums and mucous membrane of the mouth become pale and bloodless; they often present a yellow tinge. The breath has a fœtid and sickening odour, sordes accumulate on the teeth, the pulse is quick and feeble, the breathing becomes laboured, and the patient lies in a semi-comatose condition, and dies from apparent exhaustion.

Treatment.—Numerous remedies have been tried for the treatment of this disease, both by experienced dog owners and the veterinary staff. In 1887, when I was directing my attention to the treatment of a somewhat similar disease of the horse, which I have termed biliary fever, I found that that disease was very amenable to treatment by small and

repeated doses of chloride of ammonia and belladonna, and subsequent to this I recommended a trial of the same remedy for this disease of the dog, and Veterinary-Surgeon Borthwick, who succeeded me at Port Elizabeth, tried it with excellent results. Still the mortality remained very high. I subsequently tried quinine and benzoate of soda with encouraging results. Recently, since we suspected its similarity to red-water or Texas fever in cattle, we have been trying carbolic acid, which is so effective in that disease, and the results are so far very encouraging, but it is too early yet to write with any degree of confidence on the subject. With respect to preventive treatment, Dr. Carrington Purvis, in his letter above referred to, "recommends a trial of subcutaneous inoculation with blood from a dog which has recovered from the disease, as is now practised for the prevention of Texas fever of cattle." We intend to try that method, but it is very important to discover the manner in which the disease is ordinarily contracted by the dog—whether the micro-organism is conveyed to healthy dogs by ticks or other skin parasites, as the Texas fever is in cattle, and we are experimenting in that direction at the present time.

In the successful inoculation of cattle against Texas fever, it is necessary that they should be exposed to natural infection within a limited period after the operation, as the resistance conferred is more of the nature of a tolerance to the presence of the organisms than an immunity against their existence in the blood; hence, unless exposure to natural infection by the ticks follows, the inoculation requires to be repeated at short intervals to maintain a standing resistance to an acute attack. It will be apparent, therefore, how necessary it is to discover the manner in which dogs contract the disease naturally.—Cape of Good Hope *Agricultural Journal.*

THE UTILITY OF SULPHATE OF AMMONIA.

In summarising the essay with which he won the prize offered by the Sulphate of Ammonia Committee, Mr. James Muir, M.R.A.C., states that:—

1. Sulphate of ammonia is a nitrogenous manure, and must be considered as a source of nitrogen only.
2. Nine other elements besides nitrogen are essential for plant growth, of which phosphates and potash, as well as nitrogen, must usually be supplied in the manure.
3. Combined nitrogen only can be used by plants.

4. Combined nitrogen in Nature is supplied to the soil only in small quantities, and is subject to constant loss. The addition of nitrogenous manures is therefore needed.

5. Nitrogenous manures cause larger leaf growth, increased chlorophyll formation, slower maturity, and increased crops generally.

6. Organic nitrogen is of no direct use to the paint; nitric and ammoniacal nitrogen are both directly useful, though the latter almost always undergoes nitrification before use.

7. Ammoniacal manures generally fail to give their maximum result unless potash is liberally supplied by soil or manure.

8. Sulphate of ammonia reacts in the soil with carbonate of lime, and carbonate of ammonia is formed, which can then be fixed by the clay and humus of the soil.

9. Nitrogen may be lost by the volatization of carbonate of ammonia, when sulphate of ammonia has been applied to very calcareous soils; but this is rarely important.

10. Nitrification of ammonia compounds, especially sulphate of ammonia, may be very rapid when everything is favourable. It is more rapid than the nitrification of organic nitrogenous matter.

11. After nitrification the nitrogen is subject to loss by drainage.

12. Sulphate of ammonia is most effective in wet climates and seasons.

13. A small dressing of sulphate of ammonia may be applied to autumn sown crops in autumn, but most of it should be put on in spring. For all other crops it should be used at, or a little before, the time of sowing the seed. If applied late in the growth of the crop, sulphate of ammonia may cause too great rankness.

14. Sulphate of ammonia may be applied longer before sowing on heavy land than on light. It is less suitable for very calcareous soils than for either sandy or clay soils, and still less so for soils deficient in lime.

15. Sulphate of ammonia may leave a valuable residue in the soil after the removal of the crop to which it is applied.

16. Too large a dressing of sulphate of ammonia causes injury from overrankness of growth and late maturity, especially if mineral plant food be deficient in the soil.

17. Sulphate of ammonia should be mixed with dry ashes, sand, etc., for convenience of sowing, or with other manures, except those which contain lime or carbonate of lime, or which are damp.

18. Commercial sulphate of ammonia should be of 95 to 97 per cent. purity, containing about 24 to 25 per cent. of ammonia. The chief impurities, apart from sandy matter, are common salt, sulphate of soda, sulphate of iron, arsenic, sulphuric acid, and thiocyanate of ammonia, of which the last three are most injurious.

19. On wheat, sulphate of ammonia increases the quantity of the produce and improves its quality. About 1 cwt. per acre should be given.

20. On barley, sulphate of ammonia gives large increase, and on the average produces a better malting sample than other nitrogenous manures. Average dressing, ¾ to 1 cwt. per acre.

21. On oats, sulphate of ammonia usually yields a larger increase of grain than nitrate of soda, and of straw also if potash be plentifully supplied. Average dressing, about 1 cwt. per acre.

22. On mangels, when farmyard manure is used, sulphate of ammonia is probably superior to nitrate of soda in produce per acre of food for stock, and often in weight of crop. Without farmyard manure it has rather less effect. Average dressing, 1 to 2 cwt. per acre.

23. On turnips, sulphate of ammonia compares favourably with nitrate, giving as large or larger crops, which apparently keep better. Average dressing about 1 cwt. per acre.

24. On potatoes, sulphate of ammonia gives very large increase—almost always larger than that from nitrate of soda. Sulphate is also less favourable to the development of disease. Average dressing, one to two cwt. per acre.

25. On beans, sulphate of ammonia does not give any profitable result.

26. On clover, sulphate of ammonia is as effective as other nitrogenous manures, but is rarely profitable.

27. On grass land, sulphate of ammonia produces a yield in weight about equal to, or slightly less than, nitrate of soda. It specially encourages the grasses at the expense of the clovers. The produce seems to be more palatable to stock than that of nitrate of soda, and to have a high feeding value. Average dressing, 1 to 1½ cwt. per acre.

In this summary, all comparisons between sulphate of ammonia and nitrate of soda are between equal quantities of nitrogen in the two forms. This is equivalent to comparing the effect of a little over ¾ cwt. of sulphate with that of 1 cwt. of nitrate.

A NEW STAIN FOR BACILLUS TUBERCULOSIS.

BY MARION DORSET, M.D.

SUDAN III., insoluble in water, soluble in alcohol and in the essential oils, chloroform and xylol, with a red colour.

Sections are immersed for ten minutes in a saturated solution of Sudan III. in 80 per cent. alcohol, then washed for five to ten minutes in 70 per cent. alcohol. Upon examination tubercle bacilli are alone found stained red.

This stain is apparently a selective one for tubercle bacilli, as it does not stain any others.

IT is matter for congratulation that Messrs. Burroughs and Wellcome, the well-known veterinary chemists, have now completed their physiological research laboratories, which are fitted up with all the latest appliances for the preparation of the various anti-toxins in veterinary use.

No one knows better than the writer the great value of *reliable* tetanin, mallein, and tuberculin, and he has no hesitation in stating that these from this firm have that character.

Not only are these laboratories for the preparation of known toxins, but they are to be used for experimental and other work. We trust in our next issue to report having inspected the laboratories, and shall doubtless be able to give our readers some interesting details.

ABORTION IN CATTLE.*

BY VIDORA.

(*Continued from page* 351.)

Lignières said that the infection of the mother was brought about by germs found in the digestive tract, but not in the other viscera, of the fœtus and the mother; the cow, mare, and sheep were infected.

He prepared cultures of the organisms, and ingestion of these produced abortion in the guinea-pig, rabbit, and also in the cow, provided large doses were given, and the microbes were present in the placenta and tissues of the aborted animal. He believed that these organisms produced toxines which by a peculiar action paralysed the natural means of defence of the animal body against the invasion of microbes, and thus permitted great numbers of other organisms normally present in the intestines and other mucous cavities to enter the circulation and produce their effects, one of which was abortion in pregnant animals.

Not only are pregnant animals thus the transmitters of the disease, but any animal which happens to have the organism present in the digestive tube; in this manner the malady is rapidly spread to other parts by the animals themselves on the clothes of attendants, by manure, and by the fodder.

Etiology.—After a careful review of all these experiments, it will readily be seen that no single organism has satisfied scientists as being the sole and direct cause of contagious abortion; indeed, it is very probable that many organisms can produce abortion, and from the researches of Nocard it will be seen that organisms always present in the alimentary canal of animals may enter the genital organs of pregnant animals, take on pathogenic characters, and produce the disease. I, of course, refer to the bac. coli before mentioned, and may not this also be the case in the experiments made by Lignières? But I think no doubt can now be entertained that microbes play a most important part in the production of a great majority, if not of every outbreak of abortion.

The organism as described by Bang is as follows:—

A small, non-motile bacillus, which contains one, two or more, rarely three, roundish or elongated granules. The bacilli vary greatly in length, the maximum being about the size of a tubercle bacillus, *viz.*, $4 \times \cdot 2\mu$. They readily take Loffler's methylene blue stain. They are most abundantly found in the yellow exudate met with between the mucous membrane of the uterus and

* Read before the Edinburgh Veterinary Medical Society.

the fœtal membranes. In cultivations it presents the peculiarity of thriving best when the percentage of oxygen is somewhat less than it is in air (21 per cent.), or when it approaches but does not reach 100 per cent. Examination of mummified fœtuses show that the bacillus can remain virulent for at least seven months. The best culture medium is serum gelatine.

Nocard describes the following organisms :—

(1) Micrococci generated in short chains of three, four, or five sections.
(2) Short thick bacilli isolated or in pairs.

In the experiments instituted by the Highland and Agricultural Society, and conducted by Dr. Woodhead, Dr. Aitken, and Professor McFadyean, the following organisms were detected in the cultures made from the uterine discharges of aborted animals as already described :—

(1) Diplococci, each half of which is somewhat egg-shaped. They may occur in threes or fours or in short chains, and the edges are rounded ; each half of the dumb-bell is from half as large again to twice as large as the micrococcus of erysipelas. In some few cases one of the oval segments may have become elongated so as to appear like a well-formed bacillus. In plate cultures it appeared as small rounded points, opaque and dirty white, with slightly crenated margins, and there was no tendency to liquefaction of the culture medium. In the tubes of nutrient gelatine, there is first a very delicate thin film formed, and then minute yellowish white rounded points appear, which gradually enlarge but never attain any great size. The growth takes place slowly and there is never any liquefaction.

(2) An organism which appeared on the plates as minute white points, and which as they grew presented almost identical features with those of Klein's streptococcus scarlatinæ, Edington's streptococcus rubiginosus, and Fehleisin's streptococcus of erysipelas. The points appear about the fourth day, grow very slowly, and never liquefy the gelatine ; in the culture tubes, there is first a cloud formed, and then the minute rounded white points appear.

Under the microscope it consists of shorter or longer chains of small rounded cocci ; it has all the characters of the organisms of erysipelas when cultivated on gelatine.

(3) In plate cultures this appeared as a small moist patch in the form of a delicate surface film, which gave to the surrounding gelatine a faint greenish tinge. Inoculated into a test tube there is slow liquefaction of the gelatine, and the growth is slow. There is first a delicate cloud along the tracts of the needle ; this gradually becomes more marked, until there is a distinct but almost solid band which does not throw out offshoots.

Under the microscope the organism is found to be a bacillus nearly as broad as the bacillus anthracis, and four or five times as long as broad ; no spores were observed.

(4) A long thin bacillus, very like the hay bacillus, but more slender; the segments of which the threads were made up had spores at the end very like those of the bacillus subtilis, or hay bacillus. There was no liquefaction of the culture media.

(5) In some of the earlier tubes before the various organisms had been separated and described, there appeared a short thick bacillus, but no pure cultivation of it was ever obtained.

The following forms were found in the culture tubes, inoculated with a mixture of uterine discharge and water, in addition to the above described forms :

(1) A few colonies of the bacterium termo.

(2) Bacillus subtilis.

(3) An organism very like bac. subtilis, but much larger.

(4) A large diplococcus.

These latter were thought to be impurities in the water, and to have nothing to do with the production of the disease.

Period of Incubation.—The time taken by the organisms, in experiments, to produce such changes as would lead to abortion varies very much : in some of the experiments carried out by the Highland and Agricultural Society it was as short as one month, whilst in others, undertaken by Bang, it was as long as 10 weeks, and even more; Braver produced abortion in 12–21 days, Lehnert in 12–20, and Trincherd in 9-13 days.

Mode of Infection.—Little doubt can be entertained, I think, that the infective agent, whatever it be, enters by the vagina and, travelling slowly, reaches the uterus, where it sets up morbid changes which terminate in the expulsion of the fœtus. The transmission from cow to cow is most probably brought about by direct contact of the discharge from the vulva of affected animals with the hindquarters of others in the same byre. As before mentioned, the discharge which takes place from the vagina of animals which have aborted persists for some considerable time, and contains the virulent material. This, getting into the grip immediately behind the cows, passes down the byre and contaminates the tails and hindquarters of the other animals, especially when recumbent, and so infection is very easily brought about.

It is thought by Penberthy, Bang, Sand, and others, that the bull can act as a transmitter of the disease. This is quite possible, for if the bull be allowed to copulate with an

aborted cow, and then shortly afterwards with a healthy one, it is very easy for some of the discharge to be carried on the penis from the diseased to the healthy.

The litter can also be a source of contamination. The same can also be said of attendants and others, who carry the virulent material on their boots and clothes, etc.

Bang proved that the disease could be set up in the mucous membrane of the uterus by an intravenous injection of a pure culture, in which there was no morbid change in any of the internal organs, with the exception of the uterus.

It has not yet been decided whether or not the contagion can enter the blood by means of the air-passages or intestinal canal, though the experiments of Lignières would tend to show that abortion can be produced in guinea-pigs and rabbits by the ingestion of cultures of an organism found in the mesenteric glands and Peyer's patches. In my opinion, the greater number of the cases of contagious abortion are brought about by the direct entrance of the organisms into the uterus through the vagina.

Once the organisms reach the uterus they commence operations, though on what part authorities are not agreed—some believe there is implication of the membranes of the ovum, causing its death, a further incentive to abortion; Biot states that there is an infective inflammation of the serous covering of the uterus, whilst Nocard says that the fœtal membranes are attacked, the mucous membrane of the uterus remaining unaffected; the contagium, by remaining in the uterus, accounts for repeated abortion in the same animal, and is also said to account for the sterility following abortion by rendering the reaction of the uterine mucus acid, spermatozoa not being able to retain their vitality except in alkaline media.

It is a well-known fact that repeated abortion in the same subject occurs at a later period of gestation each time: the explanation seems to be either the animal obtains immunity, or the microbes gradually lose their virulence. This is a very important fact to bear in mind, as it is directly opposed to the method usually adopted by stockowners and others of getting rid of the disease, namely, the selling of aborted animals and their replacement by others, which in turn become affected; whereas if these animals be kept, isolated, of course, from the rest of the herd, and other due precautions, to be mentioned presently, taken, the disease will in all probability disappear in the course of two to four years.

The *post-mortem* appearances, as observed by all investigators, are practically the same as those so carefully recorded

by Nocard, and which have already been mentioned in an earlier part of my paper.

Symptoms.—The symptoms of sporadic and contagious abortion are, practically speaking, identical; it is impossible to say one is a case of sporadic abortion, and another is of a contagious nature, unless a minute microscopical examination be made of the uterine discharges, and then perhaps we should remain somewhat in the dark, as we have no fixed organism to look and stain for; of course, if there is a history to the case, such as the cow having received some drastic purgative or an injury, or if she has recently come from a district in which the disease is known to be rife, we can then draw our own inferences; and, to be on the safe side, I should recommend that every case be dealt with as if it were contagious. As mention has already been made of the symptoms as occurring in sporadic cases, it is unnecessary to repeat them, but I would like to call attention to one or two facts which are well worthy of being remembered.

Contagious abortion takes place, as a rule, in cattle between the fifth and seventh months of gestation, rarely before the fourth.

In the majority of cases no premonitory signs are shown; there is usually slight measiness for a short time—a couple of hours, perhaps—before abortion occurs, the general condition of the animal otherwise giving no warning of the approach of parturition, and then, after a few labour pains, the fœtus is expelled without difficulty, unless some complication be present, the mother appearing afterwards as if nothing unusual had occurred—her appetite, rumination, and other functions being in no wise altered; the fœtus is usually found dead, or if it be alive it only survives a short time. In most cases the fœtal membranes are retained, and considerable difficulty is met with on attempting to remove them: each cotyledon has to be enucleated *seriatim*.

If these membranes be retained for any lengthened period, they undergo putrefactive changes; ptomaines are formed, and these being absorbed into the general circulation induce a condition of sapræmia, manifested by general unthriftiness, loss of appetite, diminished secretion of milk, rumination suspended, feeble and often dichrotonous pulse, and other well recognised symptoms; in some cases a fatal termination is the result. This is more common in the mare, however, than in the cow.

Treatment.—Knowing the disease is of a contagious nature, prophylaxis is the chief thing to be attended to. In regard

to treatment, we must remember that the disease is one affecting the fœtal membranes, and the genital organs of the mother. When an abortion occurs the fœtus should at once be destroyed by burning, quicklime, boiling water, etc. The fœtal membranes should be removed and also destroyed. The mother must at once be isolated from the rest of the herd. Wash out the uterus once or twice daily with an antiseptic solution, such as carbolic acid (1-40th), perchloride of mercury (1-2000th), creolin 1 per cent., lysol 5 per cent., Condy's fluid 1 per cent. to 2 per cent. as long as the vaginal discharges continue; and don't put her to the bull till the discharges have ceased, which will probably take a period of six months. Thoroughly wash and scrub place where animal stood, finishing with a hot 1 per cent. solution of chloride of lime. The treatment by the administration of carbolic acid per orem in doses of 4 drams, and also subcutaneously, has not met with very much success.

The attendant on these cases must thoroughly disinfect himself before he goes near other pregnant animals; or, better still, have a separate attendant for the healthy and diseased.

Prophylaxis.—To prevent an outbreak of abortion occurring in a herd, the following methods should be strictly adhered to:—

1. Never introduce animals from an affected area to a healthy farm.

2. Prevent transmission from an infected animal to a healthy one by direct contact by the bull attendants, litter, etc.

3. Don't introduce into a healthy byre newly-bought pregnant animals, but keep them isolated, and bring them in if they go the normal period of gestation.

When once abortion has become permanent, as it were, on a farm, thorough disinfection and isolation of the affected animals must at once be carried out.

First separate all those that have aborted, put in a thoroughly clean and well disinfected byre, and let them have a separate attendant.

Next, the byres in which these animals have been must be thoroughly cleansed and disinfected as follows:—

Burn all bedding and scrapings of the floor, close all ventilators and stove well with chlorine, sulphur, or corrosive sublimate mixed with spirit; in the latter case the walls must be previously damped; a day or two after the operation of stoving, the floors and drains must be swilled with boiling water, or a hot 1 per cent. solution of chloride of lime, and

afterwards covered over with lime; scrape the walls now to prevent any chance of poisoning by corrosive sublimate, if it has been used; next limewash the walls, adding one pint of the crude carbolic acid to the three gallons of limewash. Cattle may now be admitted to the byre again, but they must be washed daily about the region of the tail, vulva, etc., with some antiseptic solution, and some recommend injecting an antiseptic into the vagina daily; the floors and drains must be washed each day with a solution of chloride of lime.

The treatment of those that have aborted, and the fœtuses, has already been described.

Nocard's recommendations are as follows:—

The floors, etc., are scraped and thoroughly cleansed, and sprinkled with a solution of sulphate of copper.

Each week from the date of conception the vaginæ should be thoroughly injected with the following tepid solution:—

Distilled water	20 quarts.
36 per cent. alcohol and glycerine aa.	3 ounces.
Bichloride of mercury	2½ drams.

The vulva, anus, and surrounding parts of all pregnant cows should be carefully sponged with the same solution.

After removal of the fœtal membranes of an aborted cow, the uterus should be irrigated, by means of a long tube, with eight or ten quarts of the solution, but containing only half the sublimate.

Aborted fœtuses and fœtal membranes should be destroyed by fire or boiling water.

It will probably take a year or two of most careful treatment before the disease is stamped out from a herd, although it is stated that it will die out of itself in the course of two or three years if no fresh cows be introduced, the idea being that the cows become immune, or that the virus becomes attenuated. From this it will be seen that the old idea of selling off every cow which had aborted was entirely wrong: in the first place it was a means of spreading the malady to other areas; and, secondly, by the introduction of fresh cows to take the place of those which were sold, a new medium was furnished in which the organisms could increase and multiply, and so maintain their ravages in the herd.

Sequelæ of Abortion.—In many cases the complications arising from abortion are very trifling, the animals appearing to suffer no inconvenience whatever; on the other hand, any of the sequelæ of a normal parturition may occur. Perhaps the most frequent is—

Retention of the fœtal membranes, which may lead on to *septic metritis*, a very serious and often fatal termination.

Others are—

Post-partum hæmorrhage.

Prolapse of the uterus or vagina, and the complications attending this accident—viz., metritis, metroperitonitis, gangrene, rupture of the uterus, hernia of the intestines.

Prolapse of the bladder.

Prolapse of the rectum.

Traumatic lesions of the genital and neighbouring organs, such as laceration and rupture of the uterus or vagina, especially in cases where delivery of the fœtus has been a matter of some difficulty.

Parturient apoplexy, post-partum paralysis, eclampsia. These are rarely met with in cases of abortion.

In addition to these we must bear in mind that often great irritability of the generative organs remains for a considerable period, manifested by frequent or almost persistent periods of œstrum, the animals do not become impregnated at the first service, and often become sterile. In the case of contagious outbreaks, if the animals do happen to hold, abortion is nearly certain to occur sooner or later; there is also the danger of the malady spreading through the entire herd, if very stringent measures are not adopted for its immediate suppression. As touching on these latter points, I may mention that only last Easter vacation I was asked by a farmer if I could recommend any treatment to prevent abortion amongst his cattle. He said that for a number of years from one to two thirds of his pregnant animals had cast calf. I asked if any isolation or disinfection was practised, and his reply was, "No." Evidently contagious abortion was at work here; so I recommended treatment on somewhat similar lines to what has been mentioned in my paper, having had practical experience as to its utility in stamping out the malady from amongst other herds.

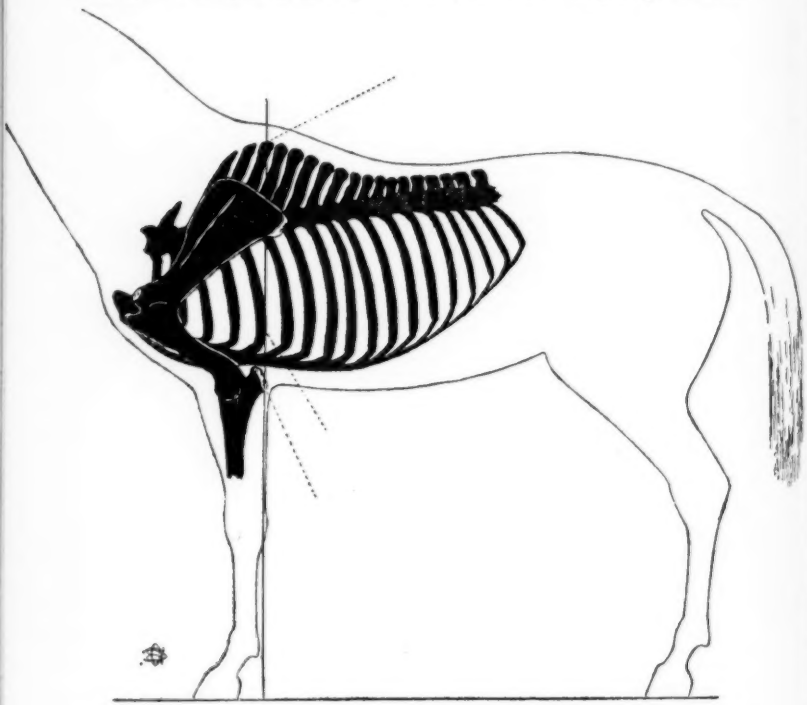
THE MEASURING OF HORSES.

BY W. OWEN WILLIAMS, F.R.C.V.S., F.R.S.E.

Year after year we hear, at shows in various parts of the country, great grumbling by exhibitors that horses are one height at one show and another height at another show. Nor is the grumbling confined to show horses. The same

complaint is frequently made in connection with polo-ponies and galloways.

As far as I am aware, there is no accepted definite law for the measuring of horses, and I purpose here making a few remarks on the subject, with the hope that they will assist us in fixing upon a general system of measuring, and one which will lead to more accurate statements as to the height of horses. I take it as accepted: 1st, that *the height of a horse*



is the distance from the sole of his fore foot to the highest part of his withers, when he stands in a normal position; 2nd, that the normal position of the fore legs is for the knee and fetlock to be perpendicular to the elbow joint. It frequently happens, however, that it is not possible to obtain these necessary conditions.

1st. Because the horse has thick shoes on.

2nd. Because his foot has been allowed to overgrow.

3rd. Because his foot has been pared away.

4th. Because he has been taught to sink his body between his shoulders.

5th. Because he stands with his fore legs extended and the knees and fetlocks are not perpendicular to the elbow joints.

6th. Because he has been taught not to stand to be measured.

And, finally, there may be combinations of these disabilities.

In many horses which have high crests it is no easy matter to be sure where the top of the withers is, as the upward curve is continuous from the hollow of the back to the top of the neck. To find out, then, where the top of the withers is, I could mention the following facts :—

1st. The top of the withers is the top of the fourth dorsal spine.

2nd. The most posterior part of the fifth rib (or the fourteenth, counting from behind forwards, which is the way to locate that rib), and the point of the elbow, are in the same perpendicular as the fourth dorsal spine.

CASE OF RUPTURED LIVER.

BY HENRY TAYLOR, M.R.C.V.S., ASSISTANT TO T. BURRELL, ESQ., M.R.C.V.S., REGENT STREET, W.

Subject.—Very fat, aged grey pony.

The patient was admitted to the infirmary about 8.30 a.m. October 4th, 1899, in a state of great distress, trembling all over, and perspiring so freely that the sweat stood in drops; eyes staring, the under lip hanging down; extremities cold; respirations 70 per minute; temperature 105°, and practically pulseless. He also seemed to be in pain, pawing now and again, and getting up and down, but it could hardly be said to be anything more than a little uneasiness.

In the afternoon he was not breathing so fast, and the skin was dry, but otherwise he appeared much the same. In the evening, when again seen, he appeared to have rallied somewhat; temperature, 103·5; respirations, 64; but the pulse was still almost imperceptible. He drank some gruel out of a bucket, but shortly afterwards presented symptoms almost like those of vomition, the head being spasmodically jerked towards the sternum; and, in addition, there were signs of abdominal pains.

Next morning, October 5th, to our surprise he was alive, free from pain, and looked certainly better; temperature, 103·6; respirations, 60·6; pulse, quick and very faint; no appetite, however.

October 6th.—Temperature, 103; respirations, 48; pulse about same as on the 5th; bowels acting. Since the previous day the visible mucous membranes had assumed a yellow tinge, and this became more evident during the next two days.

October 7th.—Temperature, 102·6; respirations only 26; pulse stronger, and only 60.

October 8th.—Temperature, 103·4; respirations increased somewhat; pulse, 76. At 10·45 a.m. he appeared much as usual, but when seen 10 minutes later, he had broken out into a cold sweat, which fairly ran off him. His pulse was so weak it could not be felt at the glossofacial artery; respirations greatly accelerated, with muscular tremors in various parts of the body. Altogether he looked as if he hadn't long to live. Still, during the course of the day he revived a little, to die during the night, however.

Post-mortem.—On opening the abdomen there was no blood in the peritoneal cavity, as one generally finds, but on removing the intestinal tract a mass was seen in the sub-lumbar region. This was about the size of a man's head, and consisted of a huge clot of blood. It was limited inferiorly by peritoneum, the same which in health assists in supporting the kidneys, so that before it could be examined this had to be ruptured. The clot was black in colour, and anteriorly contacted the caudate lobe of the liver. Owing to the rough treatment the liver received at the hands of the slaughter-man in being got out, no actual rent could be chosen as the one by which blood had escaped, but the condition of the organ left no doubt as to its origin. The liver had been affected with chronic venous congestion, and bore evidence of hæmorrhages which had taken place under its capsule at some antecedent date.

Honorary Secretaries of veterinary medical societies and associations are informed that if they will forward the MSS. of their proceedings before the 18th of the month, the Editor will have much pleasure in returning them proofs within a few days thereafter, so as to enable them to be correctly inserted in the VETERINARY JOURNAL.

Correspondence.

THE SANITARY INSTITUTE.

Parkes Museum, Margaret Street,
London, *October 31st*, 1899.

W. O. WILLIAMS, ESQ.,

Dear Sir,—Adverting to my letter of Sept. 26th, in which I said it was proposed to add a clause to the regulations for meat inspectors' examination, admitting qualified members of the medical or veterinary profession without restriction as to certificates as inspectors or training, I am directed to say that the subject has been further considered and the proposal referred to has not been adopted, as it was felt that certain disabilities would arise by this arrangement.

You will remember that I referred to the probability of the proposal not being adopted when you called here a few weeks ago.

Yours faithfully,

E. WHITE WALLIS,
Secretary.

Reviews.

Part III. of Volume XIV. of the British Dairy Farmers' Association, published by Vinton and Co., price 1s., is well worth careful perusal by the members of the veterinary profession, and we heartily commend it to our readers.

To begin with, there is an interesting experience on the "Value of Separation and Disinfection in Combating Abortion," by Mr. John Spier. Then there is a strong argument by Mr. F. P. Walker, B.Sc., in favour of a training in pure science for the farmer of the future.

The outstanding feature of interest to us, however, is a "Report on an Enquiry into the Prevalence of Tuberculosis in Dairy Cows, as revealed by the Tuberculin Test," by Professor Wortley Axe, and we quote the following portion of it:—

The prevalence of tuberculosis in dairy herds is found by this enquiry to be greater in proportion to the amount of confinement they undergo, while its entire absence is seen to be a conspicuous feature of a more natural existence. These results are precisely in accord with common experience of the mode in which the disease is spread, and present for consideration a problem of the first importance in regard to measures of prevention and suppression of the disease. That an exclusive out-door existence of milch

stock is not inconsistent with successful dairy farming is beyond dispute, but how far conditions would be found to favour the adoption of such a system as a general practice it is impossible to say. As I have already suggested, climate and soil in some districts would offer a serious obstacle to winter stocking of pasture land, but there still remains the alternative of open yards to fall back upon, which, while affording more protection, would in some measure meet that other and more universal objection—the extra requirement of food, and the diminished supply of milk, incidental to exposure of cow stock to a low temperature. There is a wide-spread opinion among those who have practised the system of close housing that the loss upon the yield of milk in the practice referred to would be prohibitive. Those, however, who adopt the open-air management aver that "the shortage of milk is compensated by the much greater cleanliness of the milk, the healthiness of the cows, and the less expense and trouble in looking after them."

To what extent the milk supply of cows bred and reared, and maintained under more natural conditions, would be influenced by a low temperature I am unable to say, but that it would be considerably less marked than in those which, after being habitually housed, are subjected to temporary exposure, might reasonably be expected. I have elsewhere pointed out the pernicious effects of close housing and other artifices of domestication in the production of abortion and parturient apoplexy in the cow herds of the country, and I have no doubt that a return to the more natural system of management indicated above would, if supplemented by the judicious employment of tuberculin and isolation of the sick, materially aid in the suppression of bovine tuberculosis, and greatly diminish the prevalence of other serious ailments affecting our cow stock.

Shed-life, with its foul and sickly atmosphere, is altogether inconsistent with continued freedom from a disease of this insidious and chronic nature, and whatever may be said of air space as a desirable hygienic provision, it is, and ever must be, subordinate to ventilation, which, at best, is an uncertain and variable quantity.

Table showing proportion of reacting animals in sheds of different capacities :—

Shed.	No. of Cows.	Cubic Space.	No. Reacted.
1	18	515	16 or 58 per cent.
2	7	570	5 „ 71 „ „
3	11	644	9 „ 83 „ „
4	12	462	8 „ 75 „ „
5	36	462	29 „ 83 „ „
6	59	596	44 „ 76 „ „
7	22	603	12 „ 55 „ „
8	9	490	1 „ 11 „ „
9	19	532	10 „ 52 „ „
10	30	416	11 „ 37 „ „

From the above it will be seen how little protection against tuberculosis cubic space affords under existing conditions of cow sheds. The highest percentage of reactions in the ten sheds is shared by No. 3 with the greatest cubic space (644 ft.) and No. 5 with the least space but one (462 ft.). Of the ten sheds the average space amounts to 529 cubic feet. If we take the five sheds above the average, and compare the number of reacting animals in them with those in the five sheds below the average, it is found that while in the former there are 55 per cent. of tuberculous cows, in the latter, with 600 cubic feet less space, there are only 45 per cent.

Well ventilated, well drained, and well lighted byres are impossible conditions in a sanitary sense save in exceptional instances. Even when all that

is needful in structural requirements is provided the dairy farmer is still at the mercy of others, whose personal comfort, taking account of temperature in particular, is distinctly opposed to the salutary influence of ventilation. Then, as to disinfection and cleansing, how few sheds lend themselves to the thorough employment of these indispensable operations, and yet in face of all this dairy farmers are recommended in unqualified terms to subject their herds to the costly ordeal of testing, separating the diseased from the healthy and re-stocking with non-reacting animals. We are not without experience of the fallacy of this course when adopted without due regard to the condition of the sheds and their capability of being disinfected and cleansed in a manner which will ensure their entire freedom from infection. Having regard to the structural state of large numbers of our byres, it is hopeless to think that this effect can be produced without substantial alterations. Indeed, from a full consideration of all the bearings of this important question, one is driven to the conclusion that, of the various obstacles to the suppression of tuberculosis in cattle, shed life is the most serious of all.

It follows from this that the eradication of the disease is very much in the hands of the dairy-farmer and stock-breeder, and it remains with them to decide as to how far confinement can be curtailed or abandoned for a more natural and wholesome existence without material loss. As a means of eradicating tuberculosis, the outdoor system of management has the merit of simplicity and economy, and contrasts favourably with the vexatious, costly, and impossible formulæ which from time to time have been put forward as "rational methods" of suppression. As to how far it is capable of being adopted is a question which must be left to dairy farmers themselves to decide when all the facts and circumstances of their particular herd and holding have been considered.

While protection against contaminated meat and milk is demanded in the interests of public health, it still remains that foul sheds and general disregard of the fundamental principles of hygiene are, like foul dwellings, the chief factors in the spread of tuberculosis.

Diseases of the Udder.

Of the 461 cows concerned in the inquiry, 51, or 11 per cent., were found to have some disease of the milk gland of one kind or another, and of the number so affected, 27, or 55 per cent., reacted to the tuberculin test. The following table shows the number of cows in each herd, and the number of reacting animals among those whose udders were diseased:—

Herd.	No. of Cows.	Diseased Udders.	Reactions.
1	93	14	9
2	76	4	0
3	74	12	8
4	59	8	8
5	47	0	0
6	40	8	0
7	36	2	2
8	20	3	0
9	16	0	0
	461	51	27

Notes of Examination of Udders.

1. Small firm circumscribed growth behind left hind-quarter.
2. Circumscribed induration of a portion of the left fore-quarter.
3. Small circumscribed growth beneath the skin, between and behind right and left hind-quarters.

4. All four quarters more or less indurated, especially those on the left side.
5. Diffused induration and enlargement of right fore-quarter—functionless.
6. Diffused induration of right fore-quarter—functionless.
7. Diffused induration of right hind-quarter.
8. Hard nodulated growth in left fore-quarter.
9. Diffused induration of all four quarters.
10. Diffused induration and enlargement of left hind-quarter.
11. Circumscribed induration of a portion of right front and left hind-quarters.
12. General induration of right hind-quarter—functionless.
13. General fluctuating enlargement of right hind-quarter.

This animal was destroyed, and the diseased quarter was found to contain about a pint and a half of yellow whey-like fluid, curd-like masses, and some broken-down gland tissue.

14. Left fore-quarter generally enlarged and indurated.
15. All four quarters more or less hardened and enlarged.
16. Slight circumscribed induration of right fore-quarter.
17. Right fore-quarter wasted and functionless.
18. Right hind-quarter indurated and wasted.
19. Right fore-quarter indurated.
20. Left fore-quarter wasted and functionless.
21. Left fore-quarter wasted and indurated.
22. Left hind-quarter enlarged and indurated. Left fore-quarter hard and wasted. Right hind-quarter indurated.
23. Right fore-quarter wasted, indurated, and functionless.
24. Right fore-quarter generally enlarged, indurated, and functionless.
25. Right fore-quarter wasted and functionless.
26. Hard circumscribed nodulated growth in left hind-quarter.
27. Firm nodulated growth in right hind-quarter.
28. Hard irregular growth in right hind-quarter.
29. Firm nodulated growth in right fore-quarter.
30. Circumscribed nodulated growth in left fore-quarter.
31. Left fore and hind-quarter wasted and functionless.
32. Left fore-quarter wasted; milk yield slight.
33. Both fore-quarters wasted.
34. Left hind-quarter slightly indurated.
35. Left hind-quarter wasted and functionless.
36. Left hind-quarter wasted.
37. Right fore-quarter wasted and functionless.
38. General induration and enlargement of right fore-quarter.
39. Right hind-quarter enlarged and indurated.
40. Circumscribed nodulated growth in left fore-quarter.
41. Circumscribed growth in left hind-quarter.
42. Right hind-quarter wasted and functionless.
43. Small circumscribed growth beneath skin of left hind-quarter.
44. Right fore-quarter wasted; milk yield slight.
45. Right fore-quarter atrophied; milk yield slight.
46. Left fore-quarter wasted; milk yield slight.
47. Irregular hard growth near to base of supernumerary teat.
48. Right hind-quarter wasted; milk yield slight.
49. Left hind-quarter wasted and indurated; milk yield slight.
50. Irregular indurated growth right hind-quarter.
51. Both hind-quarters indurated and wasted.

In 10 of the 51 cases referred to above, the milk from the diseased glands

was abnormal, and variously altered in character, some specimens being whey-like in appearance, and others consisting of a mixture of curd and pus (matter) suspended in a turbid fluid, and others, again, were mainly pus. In the great majority of cases the changes noted in the udders were the result of inflammatory action, while in some the morbid growths presented physical characters indistinguishable from those of tubercular formations.

A considerable proportion of the former presented the form of wasted and functionless glands, or what are known as "deaf" quarters.

Inoculation of Milk from Diseased Udders.

These experiments were undertaken with the object of determining if and in what proportion of the reacting cows milk taken from the diseased udders was capable of communicating tuberculosis to guinea-pigs by inoculation. In 8 of the 27 reacting beasts the diseased udders were "wasted and functionless," and afforded no material for experimental purposes. In none of them, however, were there any outward signs of tubercular disease. Two of the remaining 19 were sold before an opportunity occurred for carrying out the test, leaving 17 available for experiment.

From the diseased udders of these animals a quantity of milk was removed, and, while still fresh, 40 minims from each cow respectively were injected beneath the skin of two guinea-pigs.

The milk remaining from each sample, varying from half an ounce to two ounces, was mixed with the food of the inoculated pigs.

Eight weeks after inoculation 24 of them were destroyed under the influence of chloroform, and the rest were killed by the same means during the tenth week. A careful post-mortem examination was made of each animal immediately after death, with the following result: Of the 34 inoculated, 32 were found to be healthy; one had an abscess in the liver about the size of a pea, and the other had several minute or milliary abscesses in the same organ.

Parts of the diseased glands were microscopically examined by Sir George Brown, C.B., and found to be free from the organisms of tuberculosis.

This branch of the inquiry gives prominence to two important facts, viz., the large amount of disease affecting the udders of dairy cattle, and the remarkable freedom of tuberculous cows from udder complications. When these results are considered side by side with the alleged relation of tuberculous milk to infant mortality, one is disposed to ask if the time has not arrived when this question should be re-considered, and if the zeal of health reformers has not outrun their experience and judgment. That tuberculous milk is a fact and a danger to be dealt with goes without saying, but it seems to me that to give to it a fictitious importance may be the means of diverting attention from some more responsible cause. So far as I am aware there are no statistics bearing upon the question of infant mortality in relation to infected dwellings and infected parents, and we are quite in ignorance as to the proportion of infant life which may have been sacrificed to these home causes. The possibilty of the food of infants becoming contaminated in a germ-laden atmosphere can hardly be said to have received the attention it deserves. Sir Richard Thorne Thorne, in his Harben Lectures, lays particular stress on the dangers which attach to the presence of tubercular patients in byres and places concerned with dairy produce. In this connection he observes: "Knowing, as we do, that the dried sputa from phthisical persons are easily mingled with the air, and that aerial infection of milk easily takes place, it should be an invariable rule that no individual suffering from tubercular

consumption should be employed in connection with milch cows, with dairy processes, or in the sale of milk, and such inspection and control as I have already advised should be accompanied by periodic examination of dairy employees, and certification as to their freedom both from tubercular and other infections." If the danger to milk contamination by tubercular subjects engaged in cow sheds is of such a kind as to require these stringent precautions, how much greater must it be from this cause in the crowded dwellings of the sick poor, where every meal of the infant is exposed to a foul and germ-laden air! Without wishing to minimise the evil influence of the cow as a possible source of tubercular disease, it is permissible to ask if much of the huge mortality among infants now attributed to her may not have its origin in milk infection nearer home. Milk directly infected from the cow is the dominant idea, and at present holds the field, but there is no more real evidence of the wholesale danger to infant life attributed to this cause than there is in respect to food contaminated by personal intercourse and cohabitation with the sick in infected dwellings. It might reasonably be urged that the experiments referred to above are neither sufficiently extensive nor complete to warrant a definite conclusion being drawn as to the degree of prevalence of tuberculosis in the milk glands of dairy cows generally. They are, nevertheless, important, and might well form the starting point for further and more comprehensive inquiry and experiment by the officials of the Board of Agriculture or the Local Government Board. Tuberculosis of the udder is the *bête noir* of to-day, but, so far as I know, no systematic attempt has been made to determine to what extent it exists in our dairy herds.

The report is full of valuable facts, and should be read *in extenso.*

THE annual report of the Bureau of Animal Industry, U.S.A., for 1898 is just to hand, and reflects the greatest credit upon the Government of that country for its wisdom in having such a well-conducted Bureau. Dr. Salmon, the chief of the Bureau, must have had an enormous amount of work in preparing such an elaborate report, and the thanks of all interested in such matters are due to him for the very able way in which he has issued this report of 650 pages; every page contains matter of value and interest.

The report begins with a summary of meat inspection, and shows that 51,000,000 animals intended for human consumption were examined during life, and that 31,000,000 *post-mortems* were made, and of these 79,364 whole carcases, and 48,180 parts of carcases, were condemned.

The cost of all this inspection was about £82,000. The number of microscopic examinations of pork was nearly 3,000,000, and the cost was about £34,000.

Then follows a long report on vaccination for the prevention of black-leg or quarter-ill, and which from the report seems to be attended with great success, as in the majority of cases the annual percentage of death from the

disease has been 10 to 20 times less than it was prior to the preventive inoculation.

This success is well worth noting by British agriculturists.

There are valuable reports on hog cholera tuberculosis, a new disease affecting the vulva of heifers; anthrax, Texan fever, and many other matters of great interest, which space forbids us enlarging upon. Finally, we must compliment the printers and others who were engaged in the production of this report, as all their work is excellent.

Proceedings of the Veterinary Medical Societies, etc.

BORDER COUNTIES VETERINARY MEDICAL SOCIETY.

A MEETING of the above society was held at the Bush Hotel, Carlisle, on Friday, November 17th, when the following gentlemen were present:—Mr. Jas. Lindsay, president of the society, occupied the chair: Mr. F. W. Garnett, Mr. J. Howe, Mr. Jos. Pears, Mr. Jos. Little, Mr. Wm. McKie, Mr. Jos. W. Hewson, Mr. Crawdace, Mr. Hewitson, Mr. Caldwell, Professor Dewar, and Mr. Hy. Thompson, hon. secretary and treasurer.

Letters of apology were read from Principal and Professor W. O. Williams.

The minutes of last meeting were read and confirmed.

Mr. Wm. Scott, Penrith, was duly elected a member of the society.

Nomination of President.

On the motion of Mr. J. W. HEWSON, seconded by Mr. MCKIE, Mr. W. C. Crawdace, of Haltwhistle, was nominated as president for the ensuing year. There being no other proposal, it was carried unanimously.

Mr. W. T. HEWITSON, M.R.C.V.S., of Brampton, then read the following paper on "Milk Fever":—

Mr. Chairman and Gentlemen,—When I received the invitation from our honourable secretary, Mr. Thompson, to read a paper before this society, I scarcely knew how to answer his kind request, for I felt there were so many members much more capable than I am of performing such a task. And what to bring before you that would be of practical interest was a question of very great difficulty. Many subjects suggested themselves to me, and only after some deliberation did I fix upon the disease commonly known as *milk fever* or *parturient collapse.*

This disease is one that demands our utmost skill and attention, not only on account of its complex nature, but also because of its increasing frequency.

Every farmer and cowkeeper seems to regard it with special dread because of the great loss it entails, and it is only by meeting together in this way that we can glean from each other ideas how to prevent and combat with a disease that so often baffles our skill and leaves us disgusted with our arduous but ineffectual efforts.

As regards the nomenclature of this disease, we all know it is very unsatisfactory. It is called a fever; yet no elevation of temperature exists. It has been designated an apoplexy; this, too, must be wrong, because our patients recover quickly from this disease, unlike the case where blood is extravasated into the brain structure. The best term, to my mind, is

Parturient Collapse.—It is a disease that manifests itself in dairy cows of

all breeds, Shorthorns, Ayrshires, Jerseys, Galloways, Irish, etc. We rarely see it, if ever, in the West Highland or Aberdeen Angus. We find it chiefly in cows that are heavy milkers, not only in cattle giving a large quantity of milk, but also in those giving a rich quality. It is rarely seen in a heifer; if ever, generally at the second or third calving, or when the cow has reached maturity.

Symptoms.—The symptoms manifest themselves generally on the second or third day after parturition, occasionally delayed until the tenth day, though several authorities state that they have seen it before calving.

The cow does not properly come to her milk. The owner will notice that she does not give as much milk as she did after the previous calving. She does not eat with the same relish, she leaves part of her bran, crushed oats, or hay, as the case may be; she passes only a small quantity of dung, and often; becomes uneasy, paddling with her hind feet; exhibiting a wild, anxious expression in her eyes, looking about her and giving short bellows, whisking her tail and becoming altogether uneasy. This may go on for some hours, and if the cow was let loose she would be seen to walk with an unsteady, straddling gait. She finally lies down or almost tumbles, gets up, but soon falls again. This goes on until she is unable to rise. When down, she kicks her hind feet towards her abdomen in a spasmodic manner, giving every now and again a peculiar moan or grunt. The head soon becomes unsteady, and is turned towards the flank. She lies in this position only for a short while, when she may lift her head and dash it about, striking anything with it that happens to come in its way.

The eye is dull, the pupil dilated and insensible to the touch: spasms every now and again pass through the body. The head soon rests on the ground, saliva may flow from the mouth; and when you lift the head, on withdrawing your support the head drops to the ground with a thud. Whilst in this condition she rarely rests on the sternum, but lies flat on her side.

The rumen is distended with gas and every now and again she eructates.

The internal temperature is normal or below normal. The external temperature is low, and a cold sweat may bedew the body.

Loss of appetite, constipation, and retention of urine are present from the outset.

Pathology.—It is here where we meet with so much difference of opinion; for whereas the symptoms are so clinical and concise, the pathological lesions are just as uncertain and varied; every *post-mortem* report is different, and many are the lesions that have been found; and it is just this confusion which leads me to feel that the true nature of the condition is yet unknown.

The Reproductive System.—The generative organs are little changed. The uterus may be congested, which is usually the case immediately after parturition, or it may be paler, due to the firm contraction. I have never noticed evidences of septic absorption in any part of the parturient passages.

The Alimentary System is usually affected, the rumen being distended with gas. The omasum contains dry material between the leaves. The intestines contain hardened fæces. The gall bladder is sometimes much distended.

The Respiratory System is generally normal. Occasionally the lungs may be emphysematous; at other times they may be congested, or even in different stages of pneumonia, especially if foreign matter has gained access to the air passages.

Circulatory System.—We find dilatation of the minute arterioles throughout the body, causing considerable fall in the blood pressure.

Urinary System.—Retention with distention of the bladder is often present.

Hæmopatic System.—As far as I know, organisms have never been described in the blood, unlike puerperal septicæmia of man. There are no glandular enlargements.

Nervous System.—The pathological lesions found in the nervous system are very confusing. Some authorities have found none, others have described œdema, anæmia, exudation, and even blood clots. Karms has gone so far as to describe air in the cerebral blood vessels. Alterations have been found in the spinal cord, which was said to be congested, chiefly in the lumbar portion, and sometimes the sciatic plexus of nerves has been involved.

Nature of the Disease.—The diversity of opinion is so great that I must ask you merely to accept them as so many theories, each having their special initiator, and supported by a varying amount of credence.

1. We have the septic fever theory, caused by the introduction into the parturient passages of a septic organism, which, acting upon decomposing matter, like blood clot, produces a virulent poison, which is readily absorbed by the raw surface of the emptied womb and passes on into the system. These poisons, ptomaines, or leucomaines, especially act upon the nervous system, producing the paralysis, coma, and fall of blood pressure, etc. Yet, unlike the puerperal fever of the human race, there is no elevation of temperature, for in puerperal collapse it is rather subnormal. In puerperal fever the mortality is much higher, and if recovery occurs, that recovery is gradual, whereas in milk-fever the mortality is less, and the recovery very rapid.

2. Others say it is a gastric fever due to derangement of the bowels, such as constipation. We may have constipation and impaction; at other times there are no such symptoms, nor do they die so soon as they do in this disease.

3. *Blood-Pressure Theory.*—Another authority says it is due to the sudden contraction of the uterus. The large quantity of blood it contains at this particular time is thrown into the neighbouring vessels, and in turn the brain, giving rise to congestion of that organ, and as a consequence collapse.

4. Some think it is due to a moral influence—the removal of the calf, which causes excitement, leading to congestion of the brain.

5. Professor Violet thinks that it is explained by easy delivery (and it follows easy delivery). During pregnancy the vessels of the abdomen are subjected to considerable pressure; a rapid delivery must cause an enormous diminution of that pressure. The heart is thus enabled to drive the blood with greater force into the relaxed vascular system, causing very well-marked congestion and even hæmorrhage.

6. Frank believes it to be brought about by first an influx of blood to the skin and mammary gland. If these get a chill the blood is driven to the internal organs; if to the brain you get first congestion, followed by œdema, then extravasation. This in turn is followed by anæmia, due to the compression of the exudate upon the blood vessels of the brain tissue around, which is supposed to produce the coma.

7. It is also thought that if the lactation is suspended the colestrum that ought to be got rid of undergoes a change, and this, acting upon the nerves, gives rise to the disease.

So, gentlemen, you see that the opinions—or rather theories—put forth are just as diverse as they are numerous, and we are reluctantly led to the conclusion that the true cause of puerperal collapse is merely speculative and probably unknown.

Etiolgoy.—We know of no definite cause, but there are no doubt certain predisposing causes.

Cows that are heavy milkers, and those that give a rich quality of milk, especially if they are in high condition, are most predisposed; though cows in an average condition, or even far below par, are not exempt. Here the hygienic management may be at fault. It will generally be found that they have been scantily fed during winter, and allowed a good pasture up to calving.

It is seen chiefly in the poor man's cow that receives most attention just before and after parturition. They feed her during this time with everything they possess: Indian meal, cotton cake, crushed oats, bran, dry and scalded; in fact, there is no limit to their generosity. They think that they cannot feed her too freely, and are doing her a kindness, and keeping up her strength thereby, never dreaming they are working her ruin by predisposing her to an attack of parturient collapse.

Age.—There is no doubt that age predisposes cows to this disease, as it is generally seen after the third calf, and rarely if ever seen in primipara. This may be because the lacteal secretion has reached its highest limit, or it may be because the abdominal muscles do not adjust themselves so readily after explusion of the fœtus.

Hereditary Tendency.—Cows that are bred from mothers that have suffered from an attack are more subject to it than otherwise.

Climatic Influences.—Cold, such as draughts, or turning the cow out the day after calving, and if the weather is cold and damp, or turning her out to have a drink of cold water the day she calves, is a predisposing cause.

I have observed that I am usually called to treat one or two or even more cases on the same day. This occurs as a rule when the barometer is low—when the atmosphere is heavy and depressing; though cows take milk-fever when the barometer is contrary to this.

Duration.—If the cow should take this disease you cannot expect to have her on her feet sooner that eight hours, generally 12 to 18, though she may be for three days; if longer the case is not so hopeful. Once she gets to her legs, as a rule she will do well. I had one case, however, that lost her legs again after she had been up a day. This I attributed to incomplete evacuation of the bowels. I gave her two pounds of treacle with a dram of nux vomica, and half an ounce of ammonia carbonate, followed in the evening of the same day by two and a half pounds of fat bacon, nux vomica a dram, ammonia carbonate four drams.

The next day she was up again.

This disease may not terminate the case. She may die from asphyxia either when administering medicine or from eructation of injesta from the rumen. This injesta, coming in contact with the paralysed pharynx, is not properly swallowed, and remains over the opening of the air tube, and consequently it is drawn into the lungs, followed by septic-pneumonia and death.

By pushing your purgative or irritant medicine too quickly or in too large a quantity, not giving your patient time, you may set up inflammation of the rumen, or the abomasum, and this may kill her.

Then again you may be so unfortunate as to find your patient in a small byre where there is scarcely room to turn her; if so, she may slip through your hands, for any cow lying for more than two days in one position is liable to contract bed sores, from which she may develop a fatal septicæmia, or the prolonged pressure may lead to actual gangrene.

One case coming under my observation, which got to her feet in 24 hours, died from gangrene of the udder. If the cow has not been turned whilst lying, on attempting to rise she may fall and break her thigh; this may be due to cramp or some weakness, and necessitates a slaughter.

Diagnosis.—As regards forming a correct diagnosis, I think there need never be any serious mistake, as the symptoms of the disease are so classical and definite. The only diseases that might be mistaken for it are parturient fever, metro-peritonitis, post-partum paralysis, and parturient eclampsia.

In parturient fever you get a rise of temperature, also the same in metro-peritonitis, whilst the cow never loses her legs. In post-partum paralysis the cow is bright, will eat and drink, which she does not do in parturient collapse. In parturient eclampsia you get successive and alternative attacks of

convulsions and coma, whereas puerperal collapse is marked in its later stages by coma only. In parturient eclampsia, too, you get marked champing of the jaws and slavering.

Prognosis.—After making a diagnosis of puerperal collapse we are asked by our client what is the prognosis, and in this we must always be guarded, because some of the worst cases will recover, and those which we are inclined to regard as less severe will succumb in spite of our every effort.

There is no symptom apparent at the outset that will lead us to say definitely that the case will recover or die. If the attack comes on a few hours after calving, the chances of recovery are diminished; or again, if the animal is off her food, gives less milk, and when let loose walks with an unsteady, straggling gait, the owner neglecting to treat her, or only giving a simple aperient, trusting to Providence for the rest. She may not lose her legs until evening. With such a train of symptoms I have found the result nearly always unfavourable.

Should the symptoms, on the other hand, develop rapidly, but some time after calving, we are inclined to be more hopeful.

We may have to contend with the fearful scourge, tuberculosis, without even suspecting it. Should your patient be suffering from this disease, her constitution is already weakened, and her heart's action may be already impeded; hence you may think the case looks *primâ facie*, one you may possibly pull through, but my experience has taught me that in such a case, should I suspect it, the chances of success are remote even under the most painstaking and skilled treatment.

If the cow is comatose, lying flat on the ground with her whole body, her head down, with the tongue hanging out, saliva flowing from the mouth, with stertorous, quick breathing, and a dried condition of the vulva, now and again giving a peculiar spasmodic or twitching movement of the tail, followed by a long painful grunt, particularly if your first dose of medicine does not stop the convulsions and moaning, your prognosis then is necessarily extremely unfavourable.

Should the cow carry herself fairly well, but with somewhat sunken loins, I have found that these cases may recover from the disease, but rarely ever do they get to their feet again.

Some of the signs most favourable are normal and prolonged breathing, with an occasional long plaintive moan, with even external temperature, great masses of stringy mucous hanging from the vulvæ; passing of urine on introducing the finger into the urethra; dung appearing in the rectum, with gradual return of consciousness and desire for food and water.

Prophylaxis.—As regards the prophylaxis of this malady, I know of no absolute prevention. The chief things are to keep the bowels in a relaxed condition before and after calving, and avoid chills. This can be done by regulating the diet, or, if this fails, a pound or two of treacle can be administered a day to bring about the desired effect. Do not expose the cow to draughts after calving; see that the water she drinks be not chilled, and sheet all likely subjects immediately after calving for a few days.

Some bleed before calving; others give a dose of physic. I do not approve of bleeding, as it does not appear to be scientific, unless excessive blood pressure is present.

One dose of physic is equally useless, as you cannot be certain when the cow is to calf; if given before, and if just after, she is apt to become more constipated afterwards.

Treatment.—Now we come to the last but most important element of our subject—viz., treatment. Here, gentlemen, we are almost at a loss what line to adopt, for they are so many and varied. The medicines used represent most of the drugs found in the pharmacopœia. Every veterinary surgeon follows

his own line of treatment, which he probably considers the best. And it is quite possible that a certain drug in one man's hand will prove a success, whilst the same drug in the hand of another would prove an utter failure.

Some practitioners have so much extenuating innocence—we might give it another name—as to inform their clients that they never lost a case if they only got there soon enough. Getting there soon enough is the difficulty.

There is no disease, to my knowledge, that demands more skill or requires more attention to bring to a successful issue than this disease, known as milk-fever. Though amateurs and empirics boast of the series of cures they have performed, we must accept such statements *cum grano salis*, for, as professional men, we must feel that there is no disease which ought to be more beyond the pale of an untrained therapeutist than this one, and the sooner farmers and dairymen come and realise this the better. How often have we been called in only to find the animal dead: that she had been given a pint of whisky or somebody's "cure all," and, to use the owner's words, "I had just finished giving her it when she made a desperate struggle and died." Ah, yes; gentlemen, the poor thing died without a chance being given to her: in fact, killed outright by a man who had more courage than wit.

If we as professional men mean to be successful with this disease, that is becoming more common year by year, we must be prepared to spend a good deal of our time with our case. Here we have a disease that is of short duration: life or death will be manifest in a few hours. Therefore, it is my maxim to do as much myself as possible.

It is not my intention to discuss the various methods of treatment that are adopted in this disease, but I shall just state how I treat a milk-fever patient myself. On arriving at the place I examine her, and remove the placenta, if it is present, and wash out the uterus with a solution of Jeyes' fluid. After this I prepare a dose of medicine. I take from my medicine chest a gill of whisky that contains in it 2 oz. of chlorodyne; this I give with 3 lbs. of treacle dissolved in a gill of warm water. As there is a great danger of choking the cow, I have with me a half-inch bore gutta-percha tube, $2\frac{1}{2}$ yards long. Into the end of this I place a metal funnel. I then take hold of the tongue whilst someone steadies her head. I then introduce the free end of the tube into the œsophagus as far as it will go. Another person pours the medicine into the funnel, and it gravitates into the stomach without any danger of gaining access to the larynx. The same medicine I repeat in two hours with 2 lbs. of treacle. And after the second dose I give the same draught every three hours, and I generally find that after five doses the animal rises.

As the patient is sometimes tympanitic, or in any case, I insert a long, thin canula into the rumen, leaving it in position until the cow gains her feet, to allow any gas that may form to escape, and thus lessen the chances of eructation and choking thereby.

The cow is propped up upon her sternum, kept in this position with bundles of straw, and well clothed. I give her an injection of warm water and soap per rectum, and the hardened fæces being thus removed, two persons are left in charge to remain constantly with her, to keep on the clothing, to give the medicine if I myself cannot be present to do so, and, further, to turn her every two or three hours.

It is customary to have cold pads placed on the head, or even cold water poured on continuously. This I deem unnecessary, for it causes the cow to throw her head about, at the same time rendering her more uncomfortable.

A mustard blister is with advantage applied to the spine after the cow gains consciousness.

And, above all things else, you must allow the cow to have plenty of pure air.

Should she not offer to rise after this, I give nux vomica, a dram; ammonia carbonate, four drams; with a pound of treacle or so, twice a day.

Should gas form in abundance during the course of the disease, half a pound of salt is given to purify the bowels until a passage is gained.

As soon as the cow gains consciousness, water with a little oatmeal in it is given, and in sufficient quantities to quench her thirst.

When she does get up, all she needs, as a rule, is a spare, laxative diet and probably a little treacle or linseed oil for a few days, to make sure that her bowels are open, with an occasional tonic, such as gentian, aniseed, and nux vomica.

The seat of puncture into the rumen rarely ever gives any trouble, providing the seat of operation and your instrument have been rendered thoroughly antiseptic, and your instrument is a small one. If an abscess should form, all it requires is a free incision for the outflow of pus, and syringe out once or twice daily with a solution of Jeyes' fluid.

I have never tried the Schmidt treatment by itself, therefore I am not in a position to speak of its merits. I have tried it along with whisky, etc., and I am not in favour of it; for three of my cases so treated lost the use of their hind-quarters, which I attributed to its use, though I carried it out in the approved method.

Well, gentlemen, I fear that I have unconsciously trespassed too far upon your time and patience, but I trust there is still time for free discussion, as it is a subject that interests me very especially. It only remains for me to thank you very sincerely for your unlimited patience and generous attention in listening to my imperfect contributory paper to this worthy society to-day.

After an interesting discussion, in which Professor DEWAR took part, a vote of thanks to Mr. Hewitson, proposed by Mr. GARNETT, and seconded by Mr. HEWSON, was carried unanimously.

A vote of thanks to the chairman closed the proceedings.

THE CENTRAL VETERINARY MEDICAL SOCIETY.

A MEETING was held at the Holborn Restaurant, W.C., on Thursday evening, November 2nd, at 6 p.m. The president (Mr. Matthew Clarke) occupied the chair. There were present: Messrs. A. L. Butters, F. W. Kendall, J. S. Hurndall, S. H. Slocock, W. F. Garside, W. F. Barrett, Professor Pritchard, J. Rowe, A. Prudames, C. Sheather, H. A. MacCormack, W. S. Mulvey, and four visitors.

On the motion of Mr. SUTCLIFFE HURNDALL, seconded by Mr. BUTTERS, the minutes of preceding ordinary meeting were taken as read.

Letters and telegrams expressing regret at inability to attend were read from the Hon. Walter Long, Sir Ernest Clarke, Sir G. T. Brown, Messrs. Harrison, Villar, Chesterman, Major Nunn, Colonel F. Duck, and Major Phillips.

Nomination.

Mr. Alex. A. Johnson, M.R.C.V.S., was nominated for fellowship.

PRESIDENTIAL ADDRESS (BY MATTHEW CLARKE, ESQ.).

Gentlemen,—I feel deeply sensible of, and grateful for, the honour you have conferred upon me by electing me President of the Central Veterinary Medical Society for the ensuing year, an honour greatly enhanced by the fact that this society is one of the oldest of our veterinary societies, and numbers among its fellows some of the most prominent and influential members of our profession. At the same time I must confess that I have great misgivings as to my capability of performing the duties devolving upon me, when I call to mind the names of those who have so ably occupied the chair before me. Nevertheless, gentlemen, with your kind support, which I feel certain you

will accord me, I will endeavour to do my utmost to further the interests of this society, so that when I resign my position you may have no cause to regret the selection you have made, or the confidence you have placed in me, and I trust that the session 1899-1900 may not be an unworthy page in the history of the society.

The chief objects of these associations are to bring together the members of the profession, that they may become better acquainted and renew old friendships. To enable members to prepare subjects of interest for discussion, and to take a lively part in the debate which follows. To afford opportunity for the interchange of views, which is always an advantage, even to the best informed, and enables those of us who are too busily engaged in everyday practice to devote much time to reading to keep pace with the rapid strides which science and medicine are making. To encourage members to bring forward interesting cases or specimens which have come in their way during the performance of their professional duties, and which may lead to a good discussion, for nothing pleases a man better than that the subject he introduces should be noticed.

I do not intend to occupy your time this evening with any special subject for discussion, but should like to say a few words on some matters at present interesting us.

Meat Inspection: This ought to be thoroughly carried out, and now that veterinary surgeons are educated in this branch no one should be better able to conduct such inspection, and it is to be hoped that those in authority will be of this opinion—at all events, I think that those who are appointed should be subjected to a special examination.

I think we may congratulate ourselves, as a profession, that we have not been standing still during the last few years, but have made considerable progress in several directions. We have conquered such enemies as cattle plague, pleuro-pneumonia, foot and mouth disease, and, for a time subdued rabies, leading to the revocation of the Muzzling Order, which will enable the dogs to wipe off many old scores.

On the subject of tuberculosis much has already been said and written, and all I can say is that that which was a most difficult disease to diagnose has now become simplified by the tuberculin test and the thermometer, and may, by judicious legislation, be stamped out, if only Government will give this necessary aid.

Now a few words on the subject of glanders. The law as it stands is, in my opinion, and I venture to think in the opinion of many here present, ineffective and vexatious to the unfortunate person who may have an outbreak of this terrible disease on his premises. Before the knacker can take the animal away the owner must give notice to the police. They acquaint the inspector, who comes and gives an order for the removal and instructs that the stables be disinfected. The question then arises, what is the owner to do? Some are willing to have the remainder of their horses tested with mallein, with the usual result that a few react. What is to be done with these? They probably show no clinical symptoms; the inspector has no power to to give an order as to their future; the private vet. cannot advise his client to kill three or four horses looking worth from £40 to £80 each, there being no compensation. If he keeps them in his own stable isolated he naturally feels he may be doing himself an injustice and endangering his men. He cannot conscientiously sell them, although I am afraid some do and thereby spread the disease. Cannot we, as a body, move that a petition be made to Government to stamp this scourge out of the country, as has been done in the case of the diseases I have previously named? The equine population, I believe, is less than the bovine, and the expense to the country would probably not exceed that spent on cattle plague or pleuro-pneumonia. The

Army is, I am told, free from this disease. Do you think, gentlemen, that it will still be so after the introduction of horses from the London streets? I fear not.

There are many other matters I might have touched upon, but which no doubt will form the subject of discussion at some of the forthcoming meetings. I am obliged to you for listening to me so patiently, and I hope that when you adjourn to the adjoining room you may have a very pleasurable time.

Professor PRITCHARD, in suitable terms, proposed a hearty vote of thanks to their president for his able address, which, being seconded by Professor MACQUEEN, was carried *nem. con.*

The annual dinner was afterwards held in the Caledonian Room, and Mr. FRASER, President of the R.C.V.S., in replying to the toast of the R.C.V.S., proposed by Mr. SHEATHER, said: I thank Mr. Sheather for the generous words in which he has proposed this toast, and thank you all for the hearty response you have given to it. I am obliged to Mr. Sheather for dividing the responsibility between Mr. Hill and myself, for it will lighten my burden in responding. I need hardly say I am pleased to find myself here as your guest. I may say that a little incident which occurred in your transactions last year gave me great pleasure. I cannot easily forget the pleasure it gave me when I noticed your action in electing a president who, whilst in every way suitable for the post, was opposed, at any rate to the majority, in his medical views. I wondered whether the words were true when I read them in the weekly journal. It occurred to me that perhaps there was some other member of the profession bearing the same name, and I went so far as to search the list to see whether that was the case. I am of opinion that you did a splendid thing, gentlemen. Do not misunderstand me, however—I do not mean to infer intolerance on your part. It is a word I despise, and it would be an offence to Mr. Hurndall and yourselves. You have simply endorsed the great principle of liberty of thought and action so dear to us as a nation. If you look at it for a moment, you will find that the other branch of the medical profession, undoubtedly in advance of us in many directions, has not shown such a liberal spirit as you have. It is within the memory of everyone here that when a distinguished statesman was lying on his deathbed, a member of the medical profession was asked to meet in consultation with another whose views did not coincide with his own, and he point blank refused to do so until commanded by Her Majesty. I say that this did not reflect credit upon the medical profession. I stand before you to-night and assert that there is no one here who would not to-morrow be willing to exchange opinions with any other member of the profession whose views did not accord with his own, and hold him in equal respect to others like-minded with himself. Look at it for a moment and you will find that in the stable development of a nation liberty is the corner stone. You cannot make a man or a nation without liberty and justice. In the history of the human race you will find that all along the line there has been a tendency to suppress liberty of thought. As instances of this I may quote the names of two members of the medical profession who lived a few centuries ago. I have in my mind Copernicus and Galileo, two distinguished physicians, who were both unkindly treated by their fellow-men. Why, Galileo and Copernicus made perhaps some of the most wonderful discoveries that men have made, and it may be forgotten that the latter was probably the first to advocate the use of a thermometer as an aid to diagnosis. The people, however, could not understand them, and tried to suppress their liberty of thought; they were hounded from place to place, and far from being appreciated, were looked upon as dangerous to the community, Kepler, another for whose name I have the greatest veneration, was treated exactly as those men were. Those who did not agree with him

tried to suppress him, and adopted tyrannous methods to that end. Ultimately he was reduced to being an attendant at a beer house in order to get a living. There is another to whom I will refer, a name well known to Scotsmen (of whom there are probably some here to-night)—I mean Hugh Miller. His was a great mind, and it soared into regions where his colleagues could not follow. The treatment he received at their hands was scandalous, and so much was the public mind inflamed against him that to my personal knowledge his works were banished from many homes in Scotland. What was Hugh Miller aiming at?—simply to deliver the thoughts of men from thraldom. His end, as we all know, was tragical; but what wonder? You will have observed that the progress of the human race is always suppressed by this want of liberty of thought. You, gentlemen, by electing whom you did, said in effect: "You have perfect liberty to think what you please, but we will not on that account refuse to listen to you, but rather enjoy the prospect of gaining fresh knowledge by interchange of views." Mr. Hurndall gave you an address characteristic of the man. It was a manly, straightforward, vigorous address, and I was pleased to notice how you listened to him. I believe that liberty of thought and action is of immense benefit to the human race,

In the world as a profession we are not a strong body, we are not politically of much consequence. A very substantial proof of that is that we have to knock at the doors of Departments of State to ask whether we may be allowed to place ourselves at the disposal of the community. We are not all of us capable of doing the same kind of work—one can turn his attention to scientific subjects and another to service of a political character. However, we can all do our utmost and what we are capable of doing, and this will enable the profession to do the public service for which it is so eminently qualified. I am not at all afraid that we should be to able to perform any work that fell within the province of our profession. Of this I am sure, that we are capable of performing much more that we are allowed to do. If we possessed more political power we should be in a far more advantageous position as far as this is concerned. You will remember that when the franchise was given to working men the Conservative party recognised the advisability of securing their votes, and did not ignore the new factor in political life. What was the consequence? The Conservative party obtained a majority in the House larger than they have ever had, I think. It is probable to-night that our profession could not command more than 1,000 votes, but if it represented, say, 3,000, it would be a force that must be taken into account by those in power. I am not, however, afraid of the future—I believe if we are loyal to each other, jealous of one another's reputation, and united in our efforts, we shall more than maintain our present status. If we are kind to our patients, honourable in our dealings with all men, I am quite sure that the future will offer us a rich harvest of usefulness. I thank you, gentlemen, most heartily for the very kind way in which you have received this toast.

YORKSHIRE VETERINARY MEDICAL ASSOCIATION.

THE autumn meeting was held at the Queen's Hotel, Leeds, on Friday, October 27th. The president (Mr. T. Fletcher, of Hillsboro') was in the chair, and the attendance of members included Messrs. J. Abson, Sheffield; J. Atcherley, Harrogate; G. E. Bowman and H. G. Bowes, Leeds; J. S. Carter, Bradford; J. Clarkson, Garforth; S. Chambers, Kirkheaton; J. Cooke, Scarboro'; F. W. Clough, Morley; P. Deighton, Selby; W. F. Greenhalgh, Leeds; W. W. Lazenby, Boston Spa; A. W. Mason and A. McCarmick, Leeds (hon. sec.); J. McLean, Dewsbury; M. Robinson, Barnsley; J. E.

Scriven, Tadcaster (hon. treasurer); H. Snarry, York; Frank Somers, Leeds; W. G. Schofield, Pontefract; G. P. Hollings, Methley; A. C. Thompson, Doncaster; A. S. Waller, Skipton; G. Whitehead, Batley; S. Wharam, Leeds. Among the visitors present were Messrs. W. Woods, Wigan; F. Wragg, London; W. Dyson, G. E. Hamilton, and H. A. Child, solicitor, Leeds.

Letters explaining their inability to attend were announced from Principal Williams, Edinburgh; Professors Penberthy, Pritchard, McFadyean, London; and Major Wood, York.

Mr. W. HUNTING, of London, had consented to read a paper on "The Diagnosis of Lameness," but he wired that an accident on the underground railway had made train late at King's Cross, thus causing him to lose the connection to the North. He added that he was much disappointed, and could only offer his sincere apologies. The telegram was, it need hardly be said, a disappointment to the members and visitors assembled.

Mr. T. PRATT, of Ripon, tendered his resignation, on the ground that he could not attend the meetings, and it was accepted on the motion of Mr. A. W. MASON, and seconded by Mr. W. F. GREENHALGH.

The following gentlemen were nominated for membership: Mr. R. Cockburn, of Eastwell, Notts; Mr. A. Bennett, of Anston, Sheffield; Mr. McKenna, Huddersfield; and Mr. James Hardie, of York.

Election of Officers.

For the presidency Mr. MASON proposed Mr. M. Robinson, of Barnsley, who, he said, had always well attended the Yorkshire meeting, and took a great deal of interest in his profession.

Mr. CLARKSON seconded. The resolution was unanimously agreed to. Mr. ROBINSON, in accepting the office, said he had not the slightest idea of the compliment being paid to him. He thanked the members, and would endeavour to do his best for the association.

In accordance with the rule, the retiring president becomes a vice-president. The other two vice-presidents elected were Mr. Bowes and Mr. Chambers, the resolution being moved by the TREASURER, and seconded by Mr. GREENHALGH.

On the motion of Mr. MASON, and seconded by Mr. GREENHALGH, the Treasurer and Secretary were unanimously re-elected, the speakers testifying to the admirable way in which Mr. Scriven and Mr. McCarmick fulfilled their duties.

Mr. CLARKSON next moved, and Mr. BOWES seconded, the re-appointment of Mr. Mason and Mr. Greenhalgh as auditors. The resolution was adopted.

It was decided to purchase a pair of molar forceps for the use of members of the association.

A Perplexing Case.

In the absence of any paper, the members discussed cases which had come under their observation. Mr. CHAMBERS remarked that on Friday, the 20th of October, he was asked to examine a pony of nine hands as to soundness. The animal had been sold in Manchester to his client, pending a veterinary examination, as a five-year-old. He, however, was of opinion that it was only a two-year-old, but the pony's mouth was rather a puzzler. The teeth were not so white as suckers generally were, and had perpendicular grooves. The teeth were also large for so small a pony, and showed very even wear. To begin with, the pony was got up in first-rate form—shortened tail, castrated, shod, good manners, and altogether well-developed. There were no canine teeth or any indication of them, and the pony's mouth was so

small that he could not count the molars to be certain as to number, whether there were five or six. There were also wolf teeth. After all, the teeth were more like suckers than permanent teeth, more particularly the corner ones, and the canines were absent. Under all the circumstances he decided to certify that the pony was only 2½ years.

Mr. SNARRY thought that Mr. Chambers was right in the conclusions at which he had arrived. Irishmen were in the habit of sending polo ponies over and calling them six-year-olds, whereas they had not changed their teeth. It was a very common thing, and perhaps they might do the same in Manchester.

Mr. DEIGHTON exhibited the photograph of a recently dropped calf with six legs. The animal, he said, was the first calf of a heifer, and was presented head first. It was a very difficult case. The mother lived four days after calving.

Mr. CLARKSON said he had three clients who kept the Dexter-Kerry breed of cattle, and in two years he had seen more monstrosities from them than in all his life among the ordinary breeds. Whether it was peculiar to the class of bulls he did not know.

Mr. CHAMBERS also mentioned that a year last spring he came across a fine carting foal which had been born without any fore extremities from the scapula. It lived for about a week.

Mr. SNARRY recalled a similar case about thirty years ago.

Mr. CLOUGH said that in the neighbourhood of Morley, where he lived, there were on exhibition a three-year-old colt and a bull with only three legs each. Two years ago he had a foal born without any eyes. It was destroyed after living about a month.

The PRESIDENT explained that in his experience he had met with many freaks.

Vote of thanks to the Retiring President.

Mr. MASON said they could not allow Mr. Fletcher to retire from the chair without warmly thanking him for the way in which he had carried out his duties during the year. He accordingly moved that their best thanks be accorded to him.

Mr. SNARRY seconded in a brief but appropriate speech, and the resolution was adopted with acclamation.

The PRESIDENT said he thanked them sincerely for the vote. The affliction of deafness which had come upon him in the last one and half years had been somewhat of a disadvantage to him while filling the chair at their meetings, but he had striven to fulfil the duties of the office as well as he could. He was very pleased to now receive their unanimous vote of thanks for what he had done, and he thanked them very much indeed.

The Testimonial to Mr. Mason.

With the exhaustion of the agenda came a very interesting ceremony in the way of a presentation to Mr. A. W. Mason, consisting of a solid silver salver and tea and coffee service of Queen Anne design. The inscription on the salver set forth that the articles were "Presented to Mr. Mason, on the expiration of his term of office as President of the Royal College of Veterinary Surgeons, by members of the Yorkshire Association, as a mark of esteem and regard for the excellent services he has rendered." It devolved upon Mr. Greenhalgh, as chairman of the committee which had had the matter in hand, to ask Mr. Fletcher, on behalf of the subscribers, to make the presentation. Mr. Greenhalgh explained that the circular inviting subscriptions had been willingly responded to by the members of the Yorkshire Society, who appreciated Mr. Mason's work, not only as a veterinary practitioner, and a

member of the county organisation, but as a member of the Council of the Royal College. They felt it to be a great honour to Yorkshire that Mr. Mason was chosen President of the Royal College, and their prediction that he would worthily fill that important office had been realised. In the discharge of his duties Mr. Mason stood second to no one.

Mr. FLETCHER said he had great pleasure in acceding to the request made to him, and to ask Mr. Mason's acceptance of the silver before him. No more pleasing duty could have fallen to him in his year of office. It was now many years since Mr. Mason left the Army and started as what he might call a country practitioner. Mr. Mason had taken a leading part in connection with their own association, and had served the profession with distinction: first as a member of the Council of the Royal College of Veterinary Surgeons, and then as the president of that body. He had followed with interest Mr. Mason's work and words on the council of the Royal College, and they were quite in character with what he did at the Yorkshire meetings. If any of them got a trifle wrong or a bit out of temper in discussion Mr. Mason was the man to put them in good humour, and his advice in the matter of conducting the business of the association, and in regard to the profession as a whole, had always been most valuable. The compliment which they now desired to pay Mr. Mason was thoroughly deserved, and they all sincerely hoped that he would live many years and have the best of health.

Mr. BOWMAN said that Mr. Mason had rendered excellent services to the veterinary profession, not only in Yorkshire, but in the country. The presentation was only a slight recognition of what he had done, and they all hoped he would live many years to enjoy it.

Mr. SCRIVEN followed. He recalled that he and Mr. Mason had known each other professionally for many years, and had worked together to further the interests of the Yorkshire. The presentation committee asked him to undertake the position of treasurer, and the discharge of no duty had ever given him such great pleasure and satisfaction.

Mr. SOMERS reminded them that Mr. Mason's presidency of the Royal College of Veterinary Surgeons had been marked by skill and ability, fairness, tact, and intelligence.

Mr. ABSON also testified that Mr. Mason had conducted the work of the council in a most admirable manner.

Mr. CLARKSON said he appreciated as much as anyone Mr. Mason's many good qualities. They ought never to cease to thank him for the good he had done as a member of the Council and as the President of the Royal College; he had worked unsparingly on behalf of the profession, and thoroughly deserved the high compliment that was paid to him last year—a compliment that reflected credit upon the Yorkshire Society.

Mr. BOWES pointed out that, according to the reports, Mr. Mason had conducted the meetings of the Council of the Royal College in an admirable way. He had made an ideal President.

Mr. CARTER said he had not been on Council when Mr. Mason was President, but it was generally admitted that their representative had conducted himself in an honourable, straightforward manner.

Mr. SNARRY was, as usual, terse and to the point. He said: "I never found a truer friend in my life than Mr. Mason. I heartily endorse everything that has been said by the President and other speakers."

The PRESIDENT then formally made the presentation.

Mr. MASON was heartily applauded on rising to acknowledge the testimonial. He said he had never been placed in a more embarrassing position than having had to sit down quietly and listen to so many kind things said about him. It was, they must admit, somewhat of an ordeal. Since he started practice in Leeds in 1881 he had never looked upon a brother

practitioner as a rival, but as a man, like himself, trying to make a living and a position in the profession. He did not look upon a brother practitioner when he met him as an enemy fighting against him. It had always been his endeavour, and it would be the same in the future, that there should be no petty jealousies existing among them as a profession in Leeds. He had been elected three times on the council, and the gradual way in which he had crept up the poll had been most gratifying to him. If he had his time to come over again there was no other profession that he should take up. He thought theirs was one of the noblest of professions—to alleviate the sufferings of dumb animals. Mr. Fletcher and other gentlemen had been kind enough to speak in complimentary terms of the way in which he had conducted himself as President of the Royal College. If, as they said, he had conducted himself with advantage to the profession, he himself was satisfied, and for any inconvenience that he had been put to in journeying up to London to attend the meetings of the council, he was simply repaid by the kind observations and the handsome testimonial which they had given him. He fully reciprocated their good wishes, and hoped they would individually drop into his house—they could hardly call collectively—and again discuss their battles over a cup of tea or coffee.

At the conclusion of the proceedings the gathering were entertained to tea at the invitation of the Leeds members of the association.

EASTERN COUNTIES' VETERINARY MEDICAL SOCIETY.

THE autumn meeting of the society was held on Thursday, October 19th, at the Royal Assembly Rooms, Yarmouth, where the members first took luncheon, the president, Mr. W. F. Wragg, London, occupying the chair. The members present were Professor Pritchard and Messrs. J. E. Kitchen, London; J. Fraser, St. Albans; E. Margarson, Swaffham; A. S. Auger, Saxmundham; C. C. Clarke, Reepham; J. K. Gooch, Holt; T. E. Auger, Wymondham; J. Cleveland, Bungay; W. Shipley, senr., and W. Shipley, junr., Yarmouth; R. C. Taylor Colchester; J. F. Thurston, Fressingfield, and the hon. secretary, F. B. O. Taylor, Weston.

Professor PRITCHARD delivered an address on "Some Pathological Conditions Affecting the Appendanges of the Eye," and said: It is usual on such occasions to give an opening in the way of introduction as to what is going to be talked about. A parson commences by giving his text, and I am going to endeavour to prepare you by a few sentences to understand what you may expect from me. First, I may tell you I do not know that anything I may say will be of any new character, therefore don't expect it from me, but I have found in attending meetings of this description that renewing one's mind, making one's mind afresh acquainted with what one has heard before, is sometimes as useful as absolutely endeavouring to introduce new matter that probably has not been sufficiently fertilised to have thoroughly grown and become complete. What I am going to talk about is, as your president announced, some of the pathological conditions met with in connection with the appendages of the eye. I hope you will notice the word "some" is used, because if I endeavoured to go into all the pathological conditions in connection with the appendages of the eye, I should be told, as I have been reminded of another individual who was so exceedingly tiresome that members asked—When will the fellow leave off? I hope I shall say so much about these matters as to create discussion. I think nothing is more chilling to a man's mind after he has made a discourse than for no discussion to take place. My shoulders with these years have become pretty broad, and will bear a certain amount of weight. Criticism will not annoy me in any way or form, nor argument even in opposition for me to deal with subsequently.

The appendages of the eye consist of the lids, lashes, brows, lachrymal apparatus, muscles acting upon the globe of the eye, membrane of the lids and covering portion of the front of the eye, which we call the conjunctiva. I will commence with the eyelids. These wonderful arrangements—for they are wonderful—most persons are under the impression are in connection with the eye for the purpose of keeping out the light. Some persons may not even rove farther than that with regard to the use of these organs. Let me remind you that this probably is not the particular function of the eyelid. One of its most important functions is to carry fluid over the front of the eye. This is the lachrymal fluid, or, as it is commonly called, tears, which prevent the front of the eye becoming dry and opaque, and thereby enables the animal to judge of objects around it. You must understand that to understand some of the pathological conditions, or, indeed, any of the pathological conditions, of this appendage. We very frequently have contusion from a blow or bruise, the influence of which extends to the eyelid. As a consequence it becomes swelled, and as a consequence of this becomes enlarged; its function unquestionably is seriously interfered with. But when we go into a stable to see a horse with a swollen eyelid—it is usually the upper one on account of its size—we must bear in mind that this is not always due to contusion, a blow, or bruise. We may have a swollen condition of the eyelid as a symptom of disease. We get swollen eyelids in cases of influenza, in cases of catarrh, and there are other conditions which give rise to swelling of the lid. Constitutional ophthalmia is sometimes associated with a swollen condition of the eyelid. It is a very important matter for a veterinary surgeon very frequently to decide whether a horse is suffering from constitutional ophthalmia, or whether the swollen eyelid is the result of a blow and of little or no consequence. A torn condition of the eyelid is not an infrequent circumstance in our practice, and as you know it more frequently takes place to the upper eyelid than the lower, though it may happen to either, but more frequently to the upper lid because it is the larger and has the greater amount of movement. That is one reason why it becomes more frequently torn than the lower one. It may happen in various ways which I need not allude to. You know them as well as I do. Some of the cases we are called to where the tear or broken condition has recently been brought about. There I would suggest what you are probably as well acquainted with as I am, that the adjustment of the torn portions should be brought about as quickly as possible. Now there are various ways of doing this. I am rather inclined to lay stress or put stress upon one mode of bringing the parts together and holding them in apposition. Perchance, it will be thought my way belongs a little to the old-fashioned school. However, I am very fond of the bridge that carries me safe over. I have tried nearly all ways, but I have never found anything to succeed better than the application of the pin, passing the point through the edges of the wound, winding round the extremities of the pin a little thread made of tow, twisted between the fingers, which with a little blood upon it makes a good twist suture indeed. I have tried silk stitches, sutures; I have tried wire, catgut, and in fact all kinds of sutures, and found nothing to succeed better than a pin with a little tow twisted round the extremities. A little hint I would throw out in regard to the use of this pin. It is only recently that pins were made of anything but a kind of brass material—ordinary pins I am speaking of. Recently a pin has been made of steel, and I have found the use of this steel pin is of very great advantage over the old-fashioned pin in dealing with stitched wounds of any kind, it matters not whether in connection with the eyelid or any other part of the body. A very great mistake that is far too frequently made is that of allowing stitches and sutures to remain in until Nature's process of laceration carries them out. To my

mind that is a very bad piece of surgery, which ought to be deleted from our work, and the sooner the better. It is years ago now since I learned, and so learned that it will never be drilled out of me, that if you will stitch pieces of skin together, whatever part of the body it may be in—I am speaking now more particularly about horses—there is no necessity to leave those stitches in the wound more than 48 hours at the outside. It is a marvellous fact that you must not ask me to explain—I have my ideas, but I don't know that any man can clearly explain it—that a piece of skin that is stitched into its position, when the stitches are removed it may drop out of its place five or six inches if you like, but if that wound heals as a wound ought to heal, the piece of skin will come back into the place exactly where you stitched it, so much so that if there is any mark, which there should not be, after 48 hours, where the stitches were originally placed, those marks, although only points, will be exactly where you stitched in the first instance. To come back to the eyelid. When we used the brass pin with the tow I have spoken of, with a collection of blood round it, the decomposition of the material of the pin so tightly fixes it where you have placed it that in endeavouring to remove it in 24 or 48 hours you may rip open the wound that you wished to heal by first intention. The only harm that would follow upon that would be, the wound be a little longer in healing, but it would come back to its place. In using a steel pin, it is so easily slipped out of the position in which you placed it ; you are able to leave the tow in its original position, where it acts like a plaister, and you gain, I think, very considerable advantage.

We have another kind of torn eyelid to deal with, where, curiously enough, I need not tell you it is the wisest surgery in the world to cut the piece off—if instead of having the wound to deal with in the first instance it has been allowed to take its course, and the edges of the wound, or the torn portions, have healed or partially healed. If it is allowed to go on beyond that, and the care of the veterinary surgeon is not called in, there will be disfigurement of the eyelid for the remainder of the animal's life. Then it becomes necessary to make a fresh wound of it, to pare off the portion of the wound partially cicatrised, and bring the parts you have made a fresh wound together, and deal with as in the first instance. Now, a little hint about this. Instead of being satisfied with making a fresh wound so far as it originally existed, if you will be a little more bold, and with your scalpel make the wound on the lid a little farther into the healthier structure—increase the length of the tear, and then deal with it—you will have a considerable advantage. It is pretty nearly certain then to heal as if you dealt with it in the first instance. If you simply make a fresh wound so far as the old one existed, you may find it does not heal as you will like, and you may have to repeat the operation.

Passing from the eyelid, a word or two about eyelashes. In speaking about the appendages of the eyes I alluded to eyelashes and eyebrows. The horse has no eyebrows, therefore we need not trouble about them so far as the horse is concerned, though there are some quadrupeds that have better eyebrows even than we have. I need not remind you why the horse has no eyebrows. There is an arrangement in connection with the pupillary opening that not only does away with the necessity of the eyebrow, but it would render absolutely useless a considerable function in connection with the eyes, that of the eyelashes. The horse carries its head in such a position that an eyebrow above the orbit would be of no use. It is not everybody who knows ; it is possible there may be one individual here who is not thoroughly acquainted with the fact of the distribution of eyelashes on the horse. You know that on your eyelids and on mine the eyelashes extend from one corner of the lid to the other. They gradually increase from one corner to the centre in size, in length, on the upper lid, and on the lower lid we have a similar arrangement, though not so well developed. This is not the case in the horse.

and there are not many quadrupeds where it is the case, because in most of the quadrupeds the inner part of the bony orbit—the cavity in which the globe of the eye is placed—is so prominent that eyelashes on the inner half of the upper lid would be absolutely useless. Therefore you will find on looking at the horse's eyelid that it is only on the outer half of the lid that these lashes are developed. You will have gathered they are evidently for the purpose of shielding the eye from an extra amount of light. If the eye is shielded by a prominent orbit, they are of no particular use, therefore they are partly developed on the upper lid. What has this to do with pathology, say you? It has, because not infrequently in dogs and oxen, instead of standing out from the eyelid, pointing downwards and not interfering with the lining membranes, they are turned upwards. Sometimes this arises from inversion of the lid itself. Instead of standing out from the eyelid and nictition, blinking—may I express my surprise that some works speak of it as winking, instead of designating it nictition—being turned inward, the eyelash acts as an irritant, and the front of the eye is in a continuous state of conjunctivis. A veterinary surgeon ought to be equal to dealing with this, and I will tell you the way I have dealt successfully with it. The edge of the lid is turned inwards, and the eyelashes as a consequence, for they are on the edge, are turned inward also. I take the skin of the outer part of the eyelid, nip it up with a pair of forceps, then with a pair of sharp scissors cut a portion out, so that when the lid is allowed to escape, you have got a quarter of an inch or more in the centre gradually narrowing to the extremity of the incision. If you bring the margins of that wound which you have made carefully together, fix them, and bring about the adhesive healing process, you will find you have successfully remedied a case of inverted lid and eyelash teasing. I know another way under certain circumstances. In some instances the lid is properly formed and in proper position, but we find that the eyelashes will grow inwards instead of in the normal direction. There may be only a few, may be only one, but that is quite sufficient to keep up irritation. It is no use cutting the eyelashes off, and it is of no use pulling them out. If you take a hair out of your head, don't suppose that hair will not grow again. You have not destroyed the follicle from which it grows. If you pull out eyelashes they will reproduce themselves unless you produce so much irritation of the surface that the follicles are lacerated away. If you cut them or pare them, they will grow stronger probably than before.

Conjunctiva, the lining membrane of the lids, and the continuation of the portion of it over the front of the eye. I hesitated then for a moment, because it occurred to me what a useful symptom we get by a careful examination of the lining membrane of the lids and the portion of it which extends over the other structure of the eye. We know by looking at it whether a horse's liver is acting properly; we look at it, or should do, in all cases of inflammatory action; not only so, but in cases where the condition has given rise to excitement of the circulation we get an exacerbation or increased secretion from this membrane, but we must not come to the conclusion that the extra flow of tears is due to the condition of the membrane. It may arise from other causes, and very serious causes. It may arise from causes not absolutely located in the part. A person suffering from a bad cold, or a horse, or a dog, or any other animal suffering from a bad case of catarrh, will get an increased secretion of this fluid. Excitement will give rise to increased secretion of fluid, and you must not mix up increased secretion from the conjunctiva with increased secretion of the lachrymal apparatus. By the use of glands or ducts it is conveyed and carried over the front of the eye, and furthermore the portion of the fluid not required may evaporate from the front of the eye If you look at a horse's eye on a very cold morning you will absolutely see a vapour from the

lachrymal fluid given off in front of the eye. A portion goes off that way, and a portion becomes absorbed until it has done certain duties and then finds its way into the nostrils. Once I met with a case which I will narrate to you, as it was a rather singular case and an interesting one, where there was an entire loss of the secretion of the lachrymal gland. The horse in the stable appeared healthy and well, with no unusual or abnormal tears, eye not unusual, no congestion of the membrane. The eyes seemed to be properly retracted so long as he was standing still enjoying himself in the stable, and nothing was seen that would give anybody an idea that anything was wrong. Take him out, particularly if there was a little cold wind in the east, and he would begin to shut his eyes—would shut them completely—and the party riding him had to get off and lead him home as a blind one. This was due to a temporary cessation of the secretion of the lachrymal gland. It was a very extraordinary case and lasted some six months. By repeated application of blisters to the forehead it recovered, and a long time afterwards it was discovered that the horse had had a fall and injured its head, and there is no doubt the ganglionic nerves supplying the lachrymal gland had partially lost their functions. To that, and that only, I think can be attributed this cessation of the secretion of the lachrymal glands.

In some cases we meet a horse where there is a flow of the fluid over the side of the face. It may arise from a serious cause or a simple one. The edges of the lid are greased by a secretion of certain glands, which is a means of preventing the flow of tears to the side of the face. Simply cleaning the edge of the lids sometimes will relieve outflow. Or it may arise from interference with the passage of the tears from the inner corner of the eye into the nasal chamber. If you look at the inner corner of the horse's parietal fissure, between the lids, you will see in it a little round-shaped body the size of a pea, coloured dark brown. In the human subject it is pink coloured. On either side are two little tubes that lead into a small sac a little more inwardly placed. From that sac runs a tube into the nostril. We sometimes meet with that tube in an impervious condition, and whenever that is found in a horse it is a very serious matter. In human beings, by the introduction of a little canula or small tube, the fluid is easily conveyed into the nasal chamber. In the horse, beyond the distance this tube has to travel, and its not being so straight as in the human subject, we cannot place a canula into it and thence into the nasal chamber. Whenever in a horse you find the lachrymal fluid running on to the side of the face, if you cannot relieve it from the eyelids, you have a very serious case to deal with. You have a case which, and I think I may speak from the opinions of others with very considerable experience, it may be impossible for you to deal with successfully. I have tried many times. I have trephined the course of the tube from the facial bones, but never succeeded in bringing the flow of the fluid into the nasal chamber. I may bring your attention to one little fact. The entrance of the tube into the nasal chamber is near to the wing of the nostril and always opens on to the common integument. You probably know that the opening of this tube has been mistaken more than once for a symptom of glanders, or glanderous ulcer, but if the fact is borne in mind that the tube opens upon the common integument, and not on to the Schneiderian membrane, such a mistake would be unpardonable. It is absolutely necessary that this must open on to the common integument because the trickling of fluid from the eye would give rise to ulceration of that membrane.

While speaking about the internal corner of the eye, we have another arrangement there I want to mention, the membrana cartilago nictitans. This belongs to animals that cannot interfere with the front of the eye by

means of their extremities. The late Professor Coleman called it the horse's pocket-handkerchief. If we have any foreign body interfering with the front of the eye the animal has an opportunity of pushing this over the front of the eye and sweeping it clean of any offensive material. The protrusion of this in an eye that otherwise looks sound should render us suspicious that the animal is suffering from constitutional ophthalmia. Sometimes we get an overgrowth of this membrane, and particularly is this the case in dogs, but it is not common in the horse. There is an eminent man who advises that this should never be incised. I take an exactly opposite view. I have operated upon more than a score both in horses and dogs, and in a few cats where there has been an overgrowth, though in the cat it is very small, by simply placing a needle through the edge of it, forcibly drawing it out, taking off a portion sufficiently large, using your own judgment, and in the course of 24 hours the part has healed, and the case is cured.

There are other appendages which sometimes we have to deal with in animals on account of their abnormal condition, but luckily in the horse we have not often to deal with the muscles of the globe of the eye. It is a very common circumstance in the human subject to have an irregular length of the muscles acting upon the globe of the eye, and we get strabismus or squinting. The only occasions on which I have ever seen squinting in animals, unless it has been from a blow to the head, is in the case of rabies in dogs. Then I have often noticed strabismus. There it arises from the temporary condition of the muscles. In the human subject it is due to permanent shortening. There are plenty of morbid pathological conditions of the eye which time will not allow me to deal with. I repeat what I said at the beginning: let us have a discussion, an interchange of opinion, and what I would like is not only for you to speak of the successes you have had in connection with morbid conditions or pathological conditions but also of your non-successes. I often think that when our friends are publishing articles in the journals of the profession, if they would tell us as readily of their non-successes as of their successes we should learn a great deal more.

LINCOLNSHIRE VETERINARY MEDICAL ASSOCIATION.

The autumn meeting was held at the Albion Hotel, Lincoln, on the 12th of October. The President of the Association, Mr. J. W. Gresswell, M.R.C.V.S., of Peterborough, presided, and the following, amongst other gentlemen, were present:—Messrs. T. Holmes, Bourne; R. W. Clarke, Wragby; C. E. Norgate, Retford; C. Hartley and H. Howse, Lincoln; W. H. Brooks, Leadenham; and E. C. Russell, Grantham, the secretary.

The minutes of the last meeting, held at Peterborough, were taken as read and confirmed.

New Member.

Mr. F. Gresham, M.R.C.V.S., of Newark, was nominated and unanimously elected a member of the association.

New Rules.

The draft of the new rules for the government of the society, in accordance with a resolution passed at the last meeting, was brought up for consideration. They were gone through *seriatim*, and were ordered to be adopted subject to the amendment suggested and carried.

Luminous Radiant Heat:

Its use in Veterinary Medicine and in the Training and Conditioning of Horses.

BY F. HARTLEY, F.R.C.V.S.

Mr. HARTLEY said: The treatment of disease by heat was no new thing. At the present time, and for ages past, heat had been recognised as one of the most potent of our remedies. If a man or a horse fell sick, the first thing that was done was to see that he or it was kept warm. With human patients, perhaps, it was ordered that a fire should be lighted in their room, to keep them warm by favouring "heat-absorption." In the case of the animal an extra rug or two was put on, or in other words an endeavour was made to keep it warm by favouring "heat-retention."

So far as he knew the first serious attempt to systematise treatment by high temperature in the veterinary profession was about forty years ago, when the Turkish bath was introduced into England. Some instructive experiences had been recorded by J. E. Scriven, Esq., in his "Four Years' Experience of the Bath on an Irish Farm," published in Mr. Urquhart's excellent book on "The Turkish Bath," edited by Sir John Fife, M.D., F.R.C.S. Successful results seem to have been obtained in bronchitis, strangles, colic, dysentery, œdematous swellings, mange in horses and dogs, strains and rheumatism, particulars of which are given in many cases. There is also an interesting extract from *The Scottish Farmer* of September, 1862, giving the results obtained in Lord Kinnaird's bath at Mill Hill, in the treatment of pleuro-pneumonia. This is spoken of as effective, not only in "curing" disease, but in warding it off and preserving health. It was, in fact, protective against exposure. A horse dealer is there mentioned who, on being asked if horses accustomed to the bath readily caught cold, replied that "there was not a single horse sheeted in the place, and the top halves of the stable doors are always off; the horses are always ready for work, and you would not hear a cough in the worst season. Whenever they are severely worked or exposed they are put into the bath, and that sets them all right."

Speaking of his own personal experience, Mr. Scriven describes himself as "enjoying a new sense from the heat sent off in rays from a red hot stove." It reminded him of a practice of former years when studying engineering in Lancashire, when, after a day's hard work, he often went to the forge and exposed himself to the glowing heat of the air furnaces for half an hour, and he always found the stiffness and fatigue dispelled and so much vigour supplied that he often sought vent for it by throwing off his coat and taking to the hammer and anvil.

It would be noticed that great stress was here laid on the usefulness of "direct rays from a red-hot stove." Now, a red-hot stove was not quite a handy, safe, or even an effective way of supplying direct luminous radiation. Could it have been possible for these advanced men to have had at their disposal—as was the case to-day—substances that could be incandesced by electricity, there is little doubt but that they would have availed themselves of the fact for the purpose in question.

Another point to be noticed from the foregoing extracts was the "necessity for a high temperature." The report already referred to in *The Scottish Farmer* distinctly says "the heat required in cases of pneumonia needs to be very great—up to 200 to 212—boiling point, in fact." At a less temperature the curative effect was not visible.

Now, it is well known that, in order that such a heat may be borne, the heat must be dry. A vapour bath becomes painful at 115, and it is intolerable at 120. This brings us to the admitted drawbacks of the Turkish bath

in actual work, namely—first, in a closed chamber, however dry the air may be to start with, free evaporation from the body soon charges it with moisture: in other words, the atmosphere does not remain dry, and consequently evaporation from the body is retarded, and it becomes incapable of bearing the high temperature, the conditions of which are approaching those of a vapour bath. Secondly, in the Turkish bath it is necessary that the animal enter and breathe the heated and polluted air—air not only contaminated but also devoid of ozone—for ozone is never present with the air above a certain temperature, and it is this absence of ozone which to a great extent induces the lassitude often felt after a Turkish bath. These disadvantages, which are so well known in the case of the human subject, are many times multiplied in the case of the horse, and so it has come to pass that an admittedly excellent treatment has fallen into almost complete disuse.

To obviate these disadvantages the apparatus has been devised that I am about to describe. It is a method of applying the direct rays of heat to the body without including the head, and at the same time securing absolute dryness of the air by automatic ventilation. The source of heat is direct luminous radiation, a heat which is more penetrative, more perfectly under control, more rapid in its action, than that obtained by any other method, and it has the additional advantage that, there being no combustion, there is no contamination of the atmosphere. These points deserve the fullest and closest consideration, and must be left to those more eminently versed in physics. But at any rate, we all know that for curative purposes there is more than one way of using heat. It may be applied by direct conduction, that is, by the medium of some heated body such as hot air, hot water, hot sand-bags, hot flannels, or it may be by means of direct radiation. Until quite recently all our heating arrangements for the purpose under discussion have been of the former kind, that is, effected by some medium, but it has been pointed out by Dr. Hedley that if direct radiant heat be employed no medium is necessary—even air may be dispensed with—as radiant heat, like light, travels freely even through a vacuum. The air through which the radiation passes may be freezing, but the body upon which the heat falls nevertheless becomes warm. These heat rays may be either visible or invisible, or, as physicists say, "luminous or obscure." It is more than probable, indeed it is capable of proof, that the luminous or chemical rays have certain therapeutic advantages over the heat rays alone. Every tissue of the body is permeable to light—skin, muscle, tendon and bone—and it is not difficult to prove that light influences the nervous system, the nutrition of the cell, and the composition of the blood. It will improve anæmic conditions and favourably influence nutrition; it will diminish pain in neuralgia, sciatica, lumbago, and is useful in rheumatism. (See "Heat and Light," by W. S. Hedley, M.D., *Electrical Review*, April 21st, 1899). Further, the bactericide power of light has long been recognised, and its localised action certainly cures lupus. (See "Photo-therapeutics," by Hedley, *Electrical Review*, September 29th, 1899). But these were points that he had neither the time nor the ability to discuss on that occasion. He would therefore leave this aspect of the question and consider the addition of light as a means of intensifying the heat.

Professor Tyndall says, "If we wish to produce intense calorific effect by invisible rays, we must choose those emitted by an intensely luminous source," and he proves this by the following experiment: He took a spiral of platinum wire and gradually heated it, and, by means of lenses, prisms, and other suitable devices, an "invisible spectrum" was obtained of the rays emitted by the platinum wire, and this was permitted to fall upon the face of a delicate instrument for measuring heat, the thermopile; thus the thermopile received and recorded the invisible rays alone. Now it was found that when the platinum spiral appeared dark the radiation of these invisible heat rays

(the obscure band of the spectrum) was represented by 1, at a red heat by 18, and at a full white heat by 122. Thus we prove that as the new and more rapid vibrations (light) are introduced, the old vibrations (heat) become more intense.

This seems a good reason for using luminous heat. But there is another possible reason (still leaving out of consideration the physiological effect of light). There is a possibility, perhaps a probability, that the light rays, or at least a portion of them, when they impinge upon a solid substance are changed (or degenerated) into heat rays. At any rate it seems certain that—taking one effect alone, namely, diaphoresis—the latter is more rapid and profuse if the heat be produced from a luminous source. It must be remembered that the ordinary thermometer registers, not the direct reduction, but the temperature of the air. The air may be comparatively cold, but the body upon which the direct luminous radiant falls becomes intensely hot, as a very simple experiment upon oneself will prove. The luminous rays from an electric source are more like the sun's rays—"the temperature in the sun." Obscure heat is, so to speak, the "temperature in the shade."

Mr. Hartley said that in the apparatus he was about to describe the same object, that of a luminous radiant heat might, be obtained by gas, but there was no doubt that by far the best and most convenient and manageable source of obtaining high temperature with luminosity was to be found in the electric light. By its means heat could be obtained without combustion, and the many disadvantages in the way of air contamination, etc., were done away with. In this apparatus the heating arrangement consisted of luminous electric heaters fixed on reflecting surfaces of special construction, these surfaces being so arranged as to diffuse the reflected heat and light rays from the luminous source and project them in any given direction. The heat is under perfect control by means of a special regulator, and can be increased or diminished in a moment. These heaters are inserted in the sides of what otherwise looks like an ordinary horse box with folding doors, opening at both ends and secured by a cross-bar on the outside. The horse is led in and the attendant steps out at the doors at its head, closing them after him, the doors at the other end being closed at the same time. An asbestos-lined rug is drawn over the top of the box, falling well down all round. This rug being cut at the top end falls on each side of the horse's neck and is fastened by a light strap above and below. By this arrangement the body of the animal is in the bath for treatment, but, the head being outside, he freely breathes fresh air. The wooden shutters are drawn aside from the radiators, the current turned on, and the heat and light at once become effective. The horse cannot see the light, he only feels the heat and usually likes it.

The thermometer may mark from 250 to 350, according to the case in hand. It is scarcely necessary to say that the temperature the animal will bear, and the readiness with which diaphoresis may be produced, vary in different animals within a very wide range. The looseness of the covering secures automatic ventilation, thus preventing the air from becoming saturated with moisture, which is a *sine qua non* where high temperature is to be endured, and although sweat may be abundantly produced, it may only partly become visible; for, in such a high, dry temperature, the greater part is vaporised immediately it is formed. There is a slide for observing all that goes on inside the box, and a thermometer so placed that it can be read on the outside.

Before giving his own experience, Mr. Hartley referred to the results obtained in medical practice, where radiant heat treatment had for the past few years been rigidly on its trial. In looking through the literature on the subject he had been very much struck by some of the cases recorded. The "Therapeutics of Heat" formed the subject of discussion at

the British Balneological Society on a recent occasion. It was stated that this treatment had been effective in every form of joint trouble, even of old standing; in most forms of neuritis; in diseases of the organs of circulation, in cases of malnutrition, where there was either circulatory or muscular weakness, in many of the dry forms of skin diseases, and in conditions even so wide apart as arthritis, bronchitis, and epilepsy. Indeed, high temperature treatment had proved effective in conditions so varied that one of the speakers, referring to hot air, said that "almost all conditions of disease are benefited by it, and if I have (at the hospital) a patient suffering from any complaint, who, after a few weeks of routine drug treatment, does not improve, I at once order the hot air treatment, and in most cases improvement, to a marked degree, shows itself."

Passing on to the radiant heat treatment the same gentleman stated that his recent experiences fully proved the fact that there were some special therapeutic properties in radiant heat. Another speaker pointed out that the Dowsing radiant heat differed absolutely and entirely from the other methods of applying heat for remedial purposes, inasmuch as "in it you get—in addition to the heat—light and chemical rays."

Referring to the apparatus which he had just had completed for him, Mr. Hartley said he could not speak with absolute confidence of its effects in general veterinary practice, for up to the present he had only used it in a very limited number of cases, but from the notes he had taken of these cases he should have no hesitation in saying that as suitable cases presented themselves he should submit them to this treatment. He had had no opportunity of trying the apparatus in certain of the more acute morbid conditions for which it would appear to be eminently well suited, but he hoped soon to be able to give reports of cases of congestion of the lungs, pneumonia, ordinary chills, and other diseases of the respiratory and abdominal organs.

He was of opinion that the apparatus offered the best means yet brought forward of securing treatment by high temperatures, and he certainly considered that it was a means of improving a horse's condition by healthy sweating, without damaging the legs or exhausting the animal, and in this respect, if in no other, the luminous heat bath had a great future before it. He was certain that the treatment hardened the horse's legs, reduced the abdomen most distinctly, gave tone to the whole frame, and certainly a bloom to the coat. Apart from its strictly medical uses, he could not doubt that it would prove highly useful to owners and trainers of racehorses. He anticipated that the bath would prove of great service for horses when chilled or exhausted by extreme exertion, such as one frequently finds after hunting, and in training centres, when racehorses come off long railway journeys. A quick and thorough warming up would get rid of the congestion that is present and reduce to a minimum the chances of pneumonia and pleurisy that often supervene. Even nervous animals do not object to it, and he was fully satisfied that this bath, even in unskilled hands, could not do harm.

In conclusion, Mr. Hartley said as a general proposition it was doubtless true that the beneficial effect of luminous heat treatment was in proportion to the amount of skin surface acted upon. Therefore, as a rule, it was best to use the box which he had described, but there were other cases that might be dealt with by adding to it or by using separately a highly concentrated action localised upon some special point. This was effected by the "localiser." By its means a powerful radiation of heat and light could be projected upon any desired spot, and kept upon that spot by following any slight movement of the animal.

In reply to a few questions by members present, Mr. Hartley said the effect of the bath on exhausted horses was little short of miraculous. If the

horse was very much exhausted he should certainly give it a slight stimulant before putting it in. The animals he had tried had certainly not disliked the bath, for however restive they had been on going in they had soon become quiet and restful, and the heat appeared to have a very soothing effect. He had had them put in when in a very wearied, worn-out condition, and they had come out full of life and spirits. The usual length of the bath was 35 minutes, but this could be varied. There was no doubt that it renovated the nervous system. In cases of partial treatment there was no doubt that treatment by the localiser was far more convenient than damp and messy poultices, which were bad enough in the hands of the profession, but were often worse than useless when applied by an untrained person. When a well-groomed horse has been in the bath he comes out as if he had dusted with bran, the dandruff coming off in large scales. He did not think the luminous heat bath would be any use in spavin, for they knew the old saying, "Once a spavin always a spavin."

Mr. Hartley then invited the meeting to inspect the bath he had had built. On arriving at the infirmary in Monks Road the visitors were shown into one of the buildings, at one side of which a substantial wooden structure had been erected sufficiently large to allow a horse to stand comfortably with a man at its side. There were double doors at the top and the bottom, as already described; there was no top, the sides being held together by half circular irons, which were out of the way of the horse's head. Portions of the doors and sides were thickly padded, so that it would be impossible for the most restive horse to injure itself. On either side there were four powerful electric lights in specially constructed tubes, at the back of which were brilliant reflectors; these lights were sunk into the woodwork, and were protected from breakage by suitable iron bars. The switch board was on the opposite wall, and was so arranged that all or any one of the lights could be turned on or off independently. Near to hung the "localiser," somewhat in the shape of a wide-mouthed bell, with a powerful electric lamp inside, and a handle at the back so that the heat and light could be moved in any direction.

Mr. Hartley had a horse led into the box, the asbestos lined rug was drawn over the box and fastened down the sides and round the horse's neck. On the animal being put in the temperature registered at 80, but the electricity had no sooner been turned on than it went up by leaps and bounds, and very soon 200 was registered. The horse never moved, but seemed rather to like the sensation. Mr. Hartley very kindly explained the working of the different levers and buttons on the switch board.

A very hearty vote of thanks to Mr. Hartley for his paper, and the pleasure he had given the members of the association by allowing them to see the working of the bath, was carried unanimously.

The members afterwards dined at the Albion Hotel, when the usual loyal toasts were duly honoured.

F. C. RUSSELL, *Hon. Sec.*

THE INTERNATIONAL VETERINARY CONGRESS AT BADEN-BADEN, 1899.

REPORT OF MR. A. C. COPE,
Chief Veterinary Officer of the Board of Agriculture in London.

THE last three Veterinary Congresses discussed generally the question of the prevention of epizooties arising from international trade in various classes of animals. They also passed resolutions, through the observance of which it would be impossible to prevent the transference of these plagues from one

country to another. It was proposed that certain important Regulations should be made between the various European States, in connection with the trade in animals, as regards the veterinary police organisation to prevent the introduction of diseases.

The proposals which were made by several eminent representatives were highly approved by most of the members of the Congress. Great credit was due to these gentlemen for their valuable papers, because they exhibited a great amount of technical knowledge and indefatigable industry.

But experience has shown that these valuable proposals have hitherto received little or no attention from the various governments.

It is true that certain Conventions respecting cattle trade have been concluded between Switzerland and Austro-Hungary, between Austro-Hungary and the German Empire, and between Hungary and Servia. The Convention respecting cattle trade, concluded between the German Empire and Austro-Hungary on the 6th December, 1891, may be regarded as perfect in its way.

It has, however, been observed that some of these Conventions have again been suspended, as, for example, that between Switzerland and Austria, or that the trade in cattle between the States in question was either temporarily restricted or prohibited when it has been proved that an infectious disease of animals was carried out of one country into another. Our experience of the Conventions hitherto made respecting epizooties does not encourage the hope that the international trade in animals could be carried on with any degree of safety, and it is evident that each Government would infinitely prefer to protect its frontiers, independently of one another, by measures of their own, against the introduction of cattle diseases. There is no country in Europe which has taken measures in the matter of animal diseases which does not possess some special regulations respecting the import, export, and transport of animals, but the action taken by each country has invariably been regulated by a number of circumstances. There are many countries which facilitate the importation of animals in consequence of their great demand for animals for the purpose of human food. Other countries, having a large surplus of animal population, export animals to supply the wants of others, and in most countries in Europe a certain amount of export and import of animals is carried on in regard to cattle for draught purposes. A large and important international trade is also constantly going on in animals of great value for breeding purposes. The facilities for carrying on these international changes of stock are greatly aided by the geographical position of the countries exporting and importing, and the power to entirely prohibit this constant movement between countries is, for the reasons which I have given, often extremely difficult. It is evident, from the above remarks, that a uniform regulation of trade in animals has not yet been attained, and that most of the States have not, as yet, by any means fulfilled the initial conditions by which an international trade in animals can be safely carried out.

The Congresses at Brussels and Paris declared as an absolutely necessary condition for the establishment of such an union "that it should be agreed upon that each State taking part in it should provide its own special Veterinary Staff and organisation in order to suppress any outbreaks of the contagious diseases amongst animals with the greatest possible rapidity." Can any of the continental States assert that their veterinary sanitary service is, at the present moment, equal to these requirements? I think not.

Do we not see from the reports of the diseases of animals, issued by nearly every country in Europe, that the contagious diseases affecting cattle, sheep, swine, and horses, are constantly present in them, and that even diseases such as pleuro-pneumonia and foot and mouth disease, which we know can be eradicated like cattle plague, still reappear, though somewhat

less frequently than in former years? Austro-Hungary has taken strong measures against pleuro-pneumonia with good results, but in the German Empire it continues in the province of Saxony, where, instead of eradicating it by the stamping out system, a futile attempt has been made to check it by protective inoculation. France, with all its great claims to advancement in science, appears to be more wanting in practical knowledge and energetic action in relation to diseases of animals than any of the enlightened nations. It is only necessary to read the *Bulletin* issued monthly in that country to find that there exists in France, at the present time, every known contagious or infectious disease of animals, except cattle plague.

Let us consider the position of foot and mouth disease in the various European States. Each State is constantly, at irregular intervals, isolating itself from its neighbours by prohibitory regulations, but in spite of these regulations and the more energetic manner in which they now carry them out we find that the whole of Europe has almost without interruption for the last 12 years been a hot-bed of foot and mouth disease. The trade of each country has been injured to the extent of very many thousands of pounds yearly, their stock of cattle, sheep, and swine most seriously damaged, more especially their breeding animals. To this must be added the various diseases affecting swine, which continue to spread wider and wider, and last but not least, tuberculosis, which endangers not only the animals but also the health and life of mankind. Ever since tuberculosis has been recognised as an infectious disease, we find the owners of stock in every country using their very best endeavours to remove the diseased cattle from their farms and send them out of their districts in order to preserve their own healthy stock, by which means they spread and disperse the seeds of the diseases far and wide.

Every now and again individual States do take energetic measures to eradicate disease, for example Belgium against tuberculosis and Austro-Hungary against swine epizooties, while in most of the States measures of this description are, generally speaking, wanting.

Then, again, what organisation exists as to veterinary and sanitary police in the different States? In one State the officers are sufficiently numerous, in another insufficient, and in their technical education on the subject of the laws which regulate the spreading of the contagious diseases of animals they are often very inadequate in knowledge, ability, and organisation. In one country they have State officials quite independent of the stock owners, in another they are appointed by the local authorities of the districts. In some countries, their salaries being adequate, they can fulfil their responsible duties satisfactorily to all concerned and without prejudice; in others their remuneration is so small that their first and greatest interest is with their clients and not with the State. Europe, therefore, as a whole, is very far from possessing what may be termed uniform legislation or a complete and properly organised veterinary police. To obtain equality and uniformity of legislation and organisation such as I have suggested must be the first condition laid down in any interstate convention.

Gentlemen, as an Englishman I am certainly neither a protectionist nor an Agrarian, and I now desire to repeat what I stated when we last met in Berne.

Some 60 years ago Great Britain was believed to be free from such diseases as cattle plague, pleuro-pneumonia, foot and mouth disease, swine fever, and sheep pox. Being a foremost country in adopting what is termed a system of free trade with all other countries, she opened her ports in the forties for the reception of animals from every country in the world.

As the result of this action on the part of my country, thousands of animals, many of which were diseased, were landed in Great Britain, and as the traffic increased and the length of the time of the voyages by sea and land were

reduced these diseases were carried all over Great Britain and eventually to Ireland. The consumers in my country, who had up to that time been supplied with the choicest meat obtained from our own agriculturists, were induced to purchase foreign meat at a lower price, which was the produce of inferior animals bought in remote parts of Europe, where diseases of all kinds were rampant, and no doubt the dealers were enabled to purchase these foreign animals at an infinitely lower price than they could be purchased in my country. And what has been the result? First, foot and mouth disease, then pleuro-pneumonia, were introduced into England, and from thence all over Great Britain and to Ireland; millions of animals became diseased, and many died.

At the time when these diseases were introduced there was neither law for the prevention of animal diseases nor any veterinary organisation of any description in Great Britain.

In the year 1865 the much dreaded cattle plague was imported by some Russian cattle brought from Reval and landed at Hull. The nature of the disease was not recognised on its first appearance, as it was unknown to the veterinary profession in my country, but it soon spread throughout the whole of Great Britain and extended from the most southern part to the north of England, and subsequently to Ireland, and within the short space of less than two years 300,000 cattle died or were killed of the disease, the value of which was certainly not less than three millions of money. This represents only the direct loss; the indirect losses caused by stoppage of the cattle trade, and the increased price of milk throughout the whole of the country, in consequence of the regulations required to suppress the disease, have been estimated by some to have been of equal amount.

I have made a calculation of the losses which have followed upon the introduction of pleuro-pneumonia in the year 1842, and I have come to the conclusion that the total number of cattle which were attacked and were either slaughtered or died between that date and the final extinction of the disease in 1898 must have been about 160,000 in Great Britain alone, irrespective of Ireland, while the number slaughtered as having been in contact amounted to about 80,000, making a gross total loss of 240,000 cattle through the ravages of the disease, their approximate value being about £2,400,000.

What the expense of administration by the local authorities amounted to we do not know, but I find that between the years 1890 and 1898, during which period the disease was stamped out under the immediate direction of the Board of Agriculture's officers, the total amount spent for all purposes was £281,797.

The extent of the losses which resulted from the importation of foot and mouth disease cannot be calculated because they were more indirect than direct; some estimated it at ten shillings a head for cattle, but in any case it is quite certain that they too must be placed at millions of pounds sterling.

In 1872, and again in 1877, the cattle plague was for a second and third time introduced, and caused losses of but small amount compared with the previous outbreak of 1865-6, because the Government then possessed a staff of expert veterinarians who, having gained experience during the former outbreak, devised measures for its speedy suppression. The serious losses which my country had sustained from imported foreign diseases led to the passing of a new Act of Parliament in 1878, which compelled the Privy Council to issue orders prohibiting the importation of all cattle coming from countries in which cattle plague existed. This was the first step towards prohibition. By another order of the Privy Council every cargo of foreign animals was detained 24 and sometimes 48 hours, and they were kept under constant supervision by veterinary surgeons before release, and if a single case of pleuro-pneumonia or foot and mouth disease was detected in a cargo

on arrival, all the animals of that cargo were slaughtered at the port. It was soon discovered, however, that even these precautions were not sufficient to prevent the introduction of disease. Pleuro-pneumonia was found to be a disease which could not invariably be detected in the living animal. It, therefore, became necessary that all cattle arriving from a country infected with pleuro-pneumonia should be slaughtered on the wharf on landing. To prevent the introduction of foot and mouth disease, slaughter was at first adopted, but it was found that the virus of the disease was constantly being carried by mediate contagion through the butchers, their clothing, boots, implements, and the manure into the cowsheds, and thus causing outbreaks of that disease in the interior of the country. It therefore became necessary, when foot and mouth disease was prevalent throughout the whole of Europe, to prohibit the landing of all live cattle, sheep and swine from every part of Europe, to protect themselves from that disease.

In the meanwhile the authorities of Great Britain were not inactive. They passed numerous rules and regulations of a most stringent character, which, although entrusted to the local authorities, were supervised by officers of the Central Department, a large staff of inspectors being attached to the department for this special purpose. One of their duties was to see that the farms on which the disease existed were strictly isolated. Sometimes whole counties were placed under these restrictions, large numbers of animals were slaughtered, both diseased and those in contact; in some cases the fodder and straw were either burnt, buried, or disinfected, a strict supervision was kept over all the railway pens and landing places and trucks in which animals were carried, the market-places were placed in a condition so that they could be thoroughly washed and disinfected; and, lastly, when the disease became confined to a few centres, the clothes and boots of the attendants, and the attendants themselves, if they had been in contact with diseased animals, were disinfected, and compensation on a liberal scale was given to those farmers who had been placed under such severe restrictions, and whose animals had been killed with the object of preventing the spread of disease.

I refer my colleagues on this particular point to my special report on the prevention of foot and mouth disease which I have written for the Congress.

What undoubtedly strengthened the hands of the Department most in their endeavour to eradicate the various contagious diseases of animals was the change which took place in public opinion as regards the absolute necessity for their suppression within the country, the chief factor being the closing of the ports against the importation of foreign animals.

It is really surprising how the British public, who even at the present day are strongly in favour of the principle of free trade, and who are very jealous of the slightest interference with their rights of self-control—tradespeople and agriculturists both in town and country alike being agreed as to the importance of making more stringent provisions at the ports—cheerfully submitted themselves to regulations of a most onerous and severe character.

It has been thus that Great Britain, at much sacrifice, which not only the public but also the agriculturists had to bear, succeeded in eradicating entirely these outbreaks of cattle plague, foot and mouth disease, and pleuro-pneumonia, and have now for many years reaped the benefit, the flocks and herds of the country remaining entirely free from these diseases. Great Britain has thus proved that it possesses a code of laws and regulations for the prevention of epizooties as well as an organised system of veterinary service.

The United Kingdom of Great Britain and Ireland has passed through great trials during the last 50 years; the national property suffered losses during that period of such magnitude that they cannot be estimated. And now, after these great sacrifices, and after having discovered the means of keeping itself free from these epizooties, would it not be madness on her part

to yield to any pressure which would have for its object the withdrawal of the prohibition which has been so successful, and, in exchange, enter into any convention with any State in the world which has not yet succeeded in eradicating these diseases, from which she is now entirely free ?

At the present moment I do not think it would be possible to find any Government or Parliament, or even a single stockowner in the whole of the United Kingdom, who would be willing to depart a single inch from these now well-tested regulations, which have been formulated by the veterinary experts of the State.

I can assure you that Great Britain, in spite of its free trade tendencies, is not inclined to enter into any discussion on the subject of international regulations concerning the cattle trade, especially taking into consideration the actual state of infection which exists in most countries in Europe, and in view of the absence of any legislation or veterinary organisation which can be said to have been successful in hardly any of the European States.

I think I have shown to the members of this great and important Congress, consisting as it does of the most advanced men of veterinary science, that we in England have from time to time honestly tried every means in our power to prevent the introduction of diseases of animals within certain limits, and, as a result, we have found that slaughter at the port of landing has altogether failed in its object to prevent the introduction of disease, and that no alternative was left to us but to entirely prohibit from every country in the world in which a disease existed capable of being transmitted by mediate contagion.

Gentlemen, the further experience which I have gained during the last four years, when I last had the honour and pleasure to meet you at the International Congress at Berne, has convinced me that the only efficacious means by which we in England, and you on the Continent, can hope to protect your agriculturists and the public against the incalculable losses which are caused by these constantly recurring outbreaks of contagious diseases in animals, is to close your frontiers and entirely prohibit the movement of all susceptible animals across those frontiers. It was from this standpoint that I argued my case at Berne in 1895, and I retain the same opinions which I then held. I am entirely opposed to any attempt being made to formulate international regulations for facilitating in any manner the movement of animals from one infected State to another. I am convinced you will find that no regulations can be framed which will prove to be successful, and if attempted they will, as they did in our case, eventually break down.

With the utmost respect I venture to state that, in my opinion, the European States have a great, important, and difficult task before them before they can free their countries from all the contagious diseases of animals to the same extent as we in England; and until they have eradicated those diseases, which can be easily transmitted by persons and substances, no convention can with safety be made between one State and another for an international trade in animals.

Until that time arrives I strongly advise all the members of this Congress, or any other Congress, to decline to approve of Resolution A on the programme, and also of any motions which are in any way connected with it. This is the proposition which I, with the utmost confidence, ask the distinguished members of this International Congress of 1899 to approve, and if you do so I am convinced that you will be benefactors, not only to the agriculturists all over the Continent, but, indirectly, also to the human race.

CONTAGIOUS DISEASES ANIMALS ACT, 1864 AND 1899.

SUMMARY OF RETURNS OF OUTBREAKS for the four weeks ending November 18th, 1899.

ENGLAND AND WALES.

Pleuro-Pneumonia.	Swine Fever.	Glanders (including Farcy).	Rabies.	Anthrax.	Sheep-Scab (for month of October).
None.	Outbreaks 66 Slaughtered 904	Outbreaks 49 Attacked 67	Destroyed 7	Outbreaks 19 Attacked 23	Outbreaks 84

SCOTLAND.

None	Outbreaks 6 Slaughtered 212	Outbreaks 1 Attacked 7	None	Outbreaks 12 Attacked 15	Outbreaks 4

IRELAND.

None	Outbreaks 8 Slaughtered 167	None	Dogs 2 Other animals 0 Destroyed 75	None	Outbreaks 29

No Return for November 11th.

"THE VETERINARY COLLEGES."

THERE is, however, another side to this question, which demands the most serious consideration of stockowners. There is no reason to doubt that the other veterinary colleges in the country are suffering just as the Dick College is suffering severely, through the great reduction in the number of students that are now entering the colleges; and if the proposed Irish college, for which the Government have set apart a sum of £15,000, is to be gone on with, the reduction in the number of students entering the Scottish veterinary colleges will be much greater than it already is. As already noted, this great reduction in the number of students is partly due to the lengthening of the qualifying course from a three years' to a four years' one, but it is mainly due to the stringency of the preliminary examination, which is the same as that for the medical students, and has to be all passed at one time. These changes have been brought about by the Council of the Royal College of Veterinary Surgeons. This Royal College of Veterinary Surgeons is a body incorporated by Royal Charter for the administration of affairs in connection with the veterinary profession, and particularly in the granting of diplomas, this being

the only body in the country empowered to grant diplomas in veterinary science. Every veterinary student on passing his examination becomes an M.R.C.V.S., that is to say, a Member of the Royal College of Veterinary Surgeons. The council of this so-called "Royal College," is, in a way, the Parliament of the veterinary profession, as the members of council are elected by the votes of the registered members of the Royal College of Veterinary Surgeons. Any M.R.C.V.S. is eligible for election as a member of council, and generally, though not always, one of the professors at each of the veterinary colleges is a member of council. But these principals or professors form only a very small minority of the Council, so that the members of council who are in no way interested in the success or non-success of the veterinary colleges are the "predominant partners" in the council. These predominant partners have got into the profession themselves—some have got their sons in also—and now that they are all safe so far as the examinations are concerned, they have passed a decree that the examinations shall be more stringent, and the qualifying course shall be lengthened and made more costly, so as to make it more difficult for others to get into the profession. In this way these intriguers who are already in the profession hope to reduce the number of students entering the profession, so that they themselves may have less competition to face, and be able to exact higher fees than they otherwise could do. Their professed object is, as one of them phrased it, to ensure that the veterinary profession shall be "more 'ighly heducated." To this the obvious answer is that if these intriguers were really honest in their desire to ensure that the veterinary profession shall be "more 'ighly heducated," they would propose that the more stringent examinations in general education now enforced should be made retrospective, so as to bring within their scope all those who are already in the veterinary profession. As it is, many of those intriguers on the council of the "Royal College" have just been able to "scrape through" the less stringent examinations that formerly prevailed, and now that they are in the profession themselves they have raised the standard of examinations so as to prevent better educated men than themselves from getting into the profession, while they themselves strut about and say, "See how stringent the examinations are, and how clever we must have been when we were able to pass these examinations; and, therefore, we must have higher fees for our services." It is an open secret also that these intriguers are headed by some of the principal men in and about the Royal College, London, as they think that college, on account of the outside support it receives, will manage to pull through the present crisis, and then, when the three Scottish colleges have been starved out of existence, that college in Camden Town will flourish like a green bay tree, and be the only veterinary college in Great Britain. And what is the result brought about by this attempt to starve out of existence the three Scottish veterinary colleges? The result is that the number of students now entering the Colleges and the profession is altogether inadequate to the needs of the country, and the principals of these colleges are constantly inundated by applications for qualified assistants, which applications they are wholly unable to meet. If this state of matters goes on much longer, then, in place of the qualified veterinary surgeon, the unqualified man, with his quack nostrums, will be greatly in evidence, and the interests of stockowners will suffer in proportion. But we greatly mistake the temper and feeling of Scottish stockowners if they will stand quietly by and see three Scottish colleges starved out, so that henceforth there shall be no veterinary College in the country except the one in Camden Town, London. The remedy for the present state of matters is not far to seek. The lengthening of the qualifying course is one of the causes of the wholesale reduction of students, but it is not the principal cause. The principal cause

of the reduction is the stringency of the preliminary examination, which must all be passed at one time. This examination ranges over such subjects as Latin, French, German, Greek, etc., and a knowledge of these dead or continental languages is, no doubt, useful in many ways; but it is far from being essential to the ordinary veterinary practitioner, though one or two men in the profession have risen to place and power through translating and assimilating the ideas and discoveries of French and continental writers in veterinary science. But although the preliminary examination ranges over dead and continental languages, it would be much less difficult to face if the students were permitted to take it in two parts, instead of having to take it all at one time. A similar proposal, which was brought up by Professor Wright last spring in regard to the examinations for the national diploma in agriculture, has been adopted by the joint committees of the Royal and Highland Societies, and there is no reason why the young men who intend to enter the veterinary profession should not be allowed to take the preliminary examination in general education in the same way.

ROYAL INSTITUTE OF PUBLIC HEALTH CONGRESS AT BLACKPOOL, 1899.

CONFERENCE OF VETERINARIANS.

MEASURES TO BE TAKEN FOR THE PREVENTION OF TUBERCULOSIS IN CATTLE.

BY JOHN B. WOLSTENHOLME, F.R.C.V.S., F.R.M.S.

Tuberculosis in cattle demands the most serious attention of the community for these reasons:—

(*a*) The mortality produced in human beings from the use of milk and meat containing the disease-producing organisms.

(*b*) The great pecuniary loss inflicted by the wasting and death of infected animals.

As I am only called upon to treat of the measures necessary to minimise or prevent the spread of the disease in cattle, I shall confine myself as much as possible to that end, but all measures taken to combat this disease must be directed to the conservation of human life, as well as to economical considerations.

Within the last few years our knowledge of the facts connected with this disease has been greatly extended.

It is clearly demonstrated that tuberculosis is contagious, and, broadly speaking, is not hereditary. Each diseased animal becomes separately infected after birth by the bacilli of Koch. The usual channels of infection are by ingestion and inhalation.

As regards cattle, the weight of evidence goes to show that ingestion is the principal means by which calves become infected; and this occurs through feeding on milk.

In later life, when milk no longer is given as food, the result of post-mortem examination goes to show that the disease is usually contracted through the respiratory organs.

The most dangerous form of tuberculosis is that in which the bacilli are present in the milk. When this is the case, the mammary gland itself is usually affected. It has been proved by Bang, May, Bollinger, and Nocard that even when no disease of the udder can be found, the milk from certain cows with advanced tuberculosis is virulent, and will produce the disease on inoculation.

The next dangerous form is that in which the lungs and intestinal glands are affected, particularly so when the animal is "wasting."

In these cases, the pulmonary mucus is loaded with the bacilli, which are discharged into the atmosphere with every act of coughing. They may be inhaled directly by other animals in the byre suspended in the fine spray which is created, or the mucus may become dried, and then float in the shed as fine dust.

The dung also contains the bacilli, which, in like manner, when dried, is to be found floating in the air, and so becomes inhaled, or, falling on the fodder, is ingested.

What are the steps which should be taken to combat this disease in cattle? We may enumerate the following:—

(*a*) The medical and veterinary professions, and all sanitarians, should seek to educate the public, and especially the agriculturist, in the modes of invasion, the economical losses, and the great mortality which result from this disease.

(*b*) The establishment of a State veterinary service, the officers of which shall be prohibited from all private practice. To this service the carrying out of the regulations of the Contagious Diseases of Animals Act should be entrusted, with such assistance from local practitioners and laymen as may be necessary.

(*c*) Tuberculosis to be scheduled as a "Contagious disease of animals."

(*d*) Affections of the udder, and wasting disease, to be reported by the owner.

(*e*) To be obligatory on the private veterinary surgeon to report wasting disease, and disease of udder, when due to tuberculosis, or suspected thereof.

(*f*) Dangerously tuberculous animals to be slaughtered, with moderate compensation.

(*g*) Calves to be reared on sterilised milk.

(*h*) Greater attention paid to the cubic space; facility for rechange of air; ample light; and general cleanliness of byres.

(*i*) The stalls to be so arranged that the cattle are prevented from directly inhaling the expired breath and mucus of their neighbours.

(*j*) State control of the use of tuberculin, and its application to be made by veterinary surgeons only.

(*k*) The use of tuberculin to be encouraged by the State, by free or cheap testings, with regulated moderate compensation on slaughter.

(*l*) The establishment of public slaughter-houses all over the country, with efficient meat inspection.

This last condition would appear to be unconnected with the fight against tuberculosis in bovines, but in reality it is an almost essential necessity. For at present, except in the public abattoirs of those large towns which possess them, it most difficult to make a post-mortem examination, and at the same time it is most damaging to the reputation of a butcher that a veterinary inspector should have cause to examine and report on the carcases in his private slaughter-house.

The detection of dangerously tuberculous animals in slaughter-houses is essential, as giving clues to infected herds, and as a means of proving that the regulations as to reporting dangerous cases have not been observed.

In this country the medical profession has definitely taken up two positions with respect to the disease in human beings: First, that it is contagious; secondly, that it is preventable.

They have inaugurated the "National Association for the Prevention of Consumption," to the membership of which all sanitarians and philanthropists are invited.

It is by means of lectures, demonstrations, pamphlets, etc., that this society seeks to promote a just appreciation of the ravages caused, and the best means of combating the same.

Manchester, and one or two other large towns, so recently as the 1st of August last, have obtained powers whereby the owner of a cow supplying milk to the City—wherever the farm may be—must report disease of the udder, if that be tubercular, or suspected of tuberculosis.

There is also a penalty for selling milk from a cow with a tubercular udder, and a further penalty for keeping a cow with such a diseased udder along with other cows in milk, be it in a byre or field.

The law also permits the medical officer, or his representative if accompanied by a veterinary surgeon, to enter premises and examine cows as to tuberculosis of udder and tuberculous milk. Power is also given to prohibit entry into the city of milk from farms, when danger of tuberculosis to human beings is threatened thereby.

Such, then, is the first step taken in this country by which the law takes cognisance of tuberculosis in the living animal, and the first time it has placed any restriction or limit to the broadcast distribution of disease from such dangerous centres.

There can be no doubt that the strife occasioned in obtaining these powers has been a splendid opportunity of bringing to the mind of the public the danger which exists, and of the responsibility which should rest on those who have the care of cows.

On the other hand, how can an insidious contagious disease, widespread in man and cattle, be materially reduced by such local, feeble efforts?

Shall cows with tubercular udders be sent to districts where no questions are asked?

Shall such milk be the food of calves?

Shall the cow, whose lungs are riddled with tubercular abscesses, be permitted to cough forth the disease, so that every member in the byre becomes infected?

We cannot stop where we are. We must educate public opinion and press on to reforms such as I have enumerated.

We, as a nation, are by no means in the forefront of the attack on this disease, and I conclude by citing sundry laws which have been framed by various countries to lessen the evil:—

Sweden.

The law of 1897 orders the slaughter of animals suffering with tubercular mammitis, and further ordains that every veterinarian shall report the cases.

By the law of January, 1899, gratuitous tuberculination is allowed once a year, provided the owner comply with the regulations to reduce tuberculosis. Such measures are: Complete isolation of the sick and suspected animals from the healthy; complete cleaning and disinfection of the byre; feeding of calves with boiled or sterilised milk.

Denmark.

Law of March, 1898, prescribes the slaughter with indemnity of every cow suffering with tubercular mammitis, the compensation being 25 per cent. if the meat is used for food, and 75 per cent. if confiscated.

Norway.

The law of 1894 placed tuberculosis as a "Contagious Disease of Animals of a Mild Form," and the owner is bound to report.

Law of 1895 provides for the free testing of herds with tuberculin provided the owner observes certain regulations similar to those demanded in Sweden.

The law of 1897 prescribes that all native cattle which react to tuberculin shall be branded. Reacting foreign cattle are not admitted.

Law of 1899: Indemnity to half value is granted on slaughter.

France.

Since 1888, tuberculosis has been placed amongst the "Contagious Diseases of Animals," and that by the law of 1898 compulsory slaughter is ordered when definite symptoms of the disease are present. In case of confiscation of the meat, half value is granted when the disease is generalised, and three-quarters value when localised.

Belgium.

Strict regulations with respect to tuberculous animals exist in this country.

The law of 1897 prescribes the slaughter of all clinically-diseased animals, with compensation varying from 70 per cent. to 25 per cent. for breeding animals; 50 per cent. to 25 per cent. for others.

There is also the power to test with tuberculin the cattle from which a clinically-diseased one has been discovered.

The veterinary surgeon must report all clinically diseased.

Such, then, gentlemen, is an epitome of some regulations which are observed on the Continent, and I trust that by your vote this day the importance of adopting similar measures will be pressed upon all sanitarians, with the result that ere long they may appear on the statute books of this country.

THE VALUE OF TUBERCULIN IN THE DIAGNOSIS OF TUBERCULOSIS IN CATTLE.

BY J. MCLAUCHLAN YOUNG, F.R.C.V.S., F.R.P.S.
(Lecturer on Veterinary Hygiene, Aberdeen University.)

THE work of this conference is to discuss measures to be taken for the prevention of tuberculosis in the lower animals and its spread therefrom to human beings. Considering this, then, to be our work, if any apology be needed for my paper it lies in the fact that I consider the very earliest measure is to diagnose the presence of the disease. When we have once determined where the disease exists and where it does not we are then in a position to use means to protect the sound animals and to regulate the movements of the unsound. There are many who have for long desired that tuberculosis be placed under the Contagious Diseases (Animals) Act, but I for one certainly think those in authority were wise in their refusal when we consider the dubiety that existed in the diagnosis. It is unfortunately true that by a mere clinical examination it is difficult—sometimes actually impossible—to detect the presence of the disease, and thus a tuberculous cow might be allowed to remain in a cowshed disseminating the disease to her companions. However, within recent years much has been, and is still being, done to remove the doubt, and tuberculin has been introduced as an aid, but it is curious to notice the diversity of opinion that exists as to its value. Some declare it to be almost infallible, while others, equally positive, say it is not to be relied upon. Now this seems strange, for the conditions vary so little all over the country that if tuberculin is pure and fresh, and the instructions strictly followed, the test must prove, in everyone's hands, either worthless or of great value. For this reason I am inclined to say that much has been said and written concerning the test by men who have not had sufficient experience to

give anything like proof for their assertions. Again, some neglect the fundamental principle of success—cleanliness—and the results are so unsatisfactory that the operator blames the test, and straightway, adopting a tone of authority, writes to the journals declaring the test to be of little value. This is to be regretted, as the man is a mere tyro in science who is not correct and exact in the most minute detail. I am not at this time going to venture an opinion, but being fortunate enough to have been asked by the Agricultural Department of the University of Aberdeen to undertake a series of experiments with tuberculin, I wish to lay before you to-day some of the results obtained, in the hope that they may help, in however small a degree, to enable us to form an opinion as to the true value of tuberculin.

Dr. Walker, special assistant in bacteriology to Professor Hamilton, joined me in the work, and undertook to make a careful examination of the carcases on slaughter. It might be mentioned that he had no knowledge of the results of the testing which I had done a few days previously. In most cases the test was applied to the cattle on the farms where they had been fed during the winter, but in order to make the number experimented upon as high as possible, a few animals were tested in the sheds of the slaughter-house. In the selection of these animals great care was taken, as only those which had been standing for a few days, and whose temperatures were normal at the several testings, were used.

In all we tested 100 bullocks, 60 heifers, 65 cows, and two bulls. The bullocks, with one exception, were all two years old; the heifers about two months younger; the bulls three years; while the average age of the cows was seven-and-a-half years. The tuberculin was obtained in quantities of from 10 to 30 doses, from the Royal Veterinary College, London, and was guaranteed by the authorities to be pure and fresh.

The syringe used was an ordinary glass one, with an asbestos piston, and was regularly disinfected in corrosive sublimate, and the needle frequently boiled.

The inoculation was made under the skin immediately behind the shoulder, and as far as possible in the evening; the temperature being taken at the 10th, 11th, 12th, and 13th hour afterwards. In many of the cases the temperature was taken at a later period, but it was found that the temperature was generally at its highest about the 12th or 13th hour.

Of the 100 bullocks, 21 gave the characteristic reaction, and were found tubercular. In one case, although the temperature did not rise from 103°, the animal was dull, restless, and refused its food, thus indicating a suspicious condition, if not sufficient to warrant a positive opinion. This was the only animal throughout the experiments which was visibly affected by the tuberculin. It is also interesting to note that in many instances we found reaction and tubercular lesions in animals standing next each other in the byres. This I take as a proof of the infectious nature of the disease, as we had more of such examples than could occur as a mere coincidence.

In addition to the 21, tuberculous lesions were found in three cases in which no reaction had been obtained. In the first a hard, fibrous nodule, about the size of a hazel-nut, was found in the right lung. This was an old encysted tubercle, which was probably no longer active. About three years ago I recorded a similar case in a pure-bred Aberdeen Angus cow where no reaction was obtained, but on slaughter an encysted mass was found in the lungs. In each of the other two cases the only lesion was a small nodule about half the size of a pea, in a mesenteric gland. One of these, microscopically, presented the appearance of a tuberculous gland, and was pronounced by Professor Hamilton to be such, while in the other case inoculation of a guinea-pig was made, and tubercle bacilli recognised in the lesions produced.

Of the 60 heifers tested six reacted and were found tubercular on

slaughter, while in four other cases no reaction was obtained, although lesions were found in the carcases. The first two of these occurred in a lot of four which had purposely been tested with mixed tuberculin. By mixed tuberculin I mean one half fresh and the other half over a year old. Another was one of the class which is termed suspicious, because the temperature did not rise sufficiently high to warrant us placing it in the unsound class. Curiously enough, it occurred when on one occasion a strange syringe was used, and this may or may not have had an influence. The remaining case was a most diminutive heifer, rising three years, and it is just possible that on account of her abnormal size (she was about the size of a six months calf) I gave her too small a dose. Attention might be drawn to the fact that we had more isolated cases than with the bullocks—*i.e.*, a heifer affected, but her neighbour in the same stall sound.

The apparent failure of tuberculin to detect the disease in cows has for some time been a subject of much controversy, and we paid particular attention to this. Of the 65 cows tested, only 21 reacted, although as many as 39 were found tubercular. A record of the ages of the animals was kept, and there it was noticed that the 21 which reacted were mostly young cows, while the tubercular but non-reacting animals were all old, and without exception we found the lesions in those which reacted to be of a much less extensive nature than in the old, non-reacting animals.

From this we deduce that where the disease is generalised and of considerable duration, and the animal more or less emaciated, tuberculin is not reliable. We feel, however, that 65 cases are not enough to give us sufficient data for strong statements, therefore we are to continue our work among cows until we get at least 100, when we hope to publish the results.

The disease in bullocks and heifers was most commonly found in the bronchial and mediastinal glands, occurring in the first-named in 17 cases and in the latter in 11. The lungs came next, there being 14 cases, while in six of these the lesions were limited to the lungs. It was also remarkable with what frequency the disease was found in the tonsils, being demonstrated there in four cases. The pharyngeal glands were diseased in five cases, while the mesenteric glands were comparatively free, as in only five cases was tubercular deposit found, and in three of these it appeared to be part of a general affection. In the two cases where the condition was limited to these glands the lesion was minute, and, it is worthy of note, gave rise to no reaction. This seems to prove what some authorities say, that there must be a "substantial focus" of tubercle before the reaction will take place. Lesions were found on the pleura in three cases, on the peritoneum in two, and in the liver in five.

In the cows the bronchial and mediastinal glands and the lungs were affected in every case, while on the pleura lesions were found in only eight instances. The liver was diseased in nine cases, the peritoneum in four, the udder in six—two very extensively—and the right kidney in one.

A most significant circumstance is the extraordinary difference in the prevalence of the disease in heifers and cows. In heifers we found it occurring in 16 per cent., while in cows it occurred in as many as 60 per cent. Thus it must be that 44 per cent. of cows become affected between the age of two years and seven-and-a-half-years—to my mind a very strong proof of the infectious nature of the disease.

What is certainly a point of great interest is the fact that the udder was affected in so many cases. It has been, and I suppose is still, held by authorities that the udder is rarely the seat of tuberculosis, but from our investigation it seems that this is not so. Of the 65 cows examined, we found six had the udders diseased, and this works out just a fraction under 10 per cent. Again, it means that almost 16 per cent. of tuberculous cows have lesions to a

varying degree in the udder. This high percentage prompts the feeling that, although many exaggerated statements have been made concerning tuberculosis and its transmission to human beings, much more harm can be done by under-estimating the danger; and as we have found, within a fraction, 10 per cent. of dairy cows having tuberculous udders, I am strongly of opinion that to simply say that "there is a distinct menace to human health existing at the present time through the prevalence of tuberculosis among cattle" is putting it too mildly, and not doing our duty in the interests of public health.

Of the two bulls tested, one reacted, and was found to have left lung and pleura affected; whie the other gave no reaction and was sound.

Our figures then, gentlemen, are:—

100 bullocks tested—	21	reacted;	24	tubercular.
60 heifers "	— 6	"	10	"
65 cows "	—21	"	39	"
2 bulls "	— 1	"	1	"
—	—		—	"
227	49		74	

In conclusion, Mr. President and gentlemen, you will allow me to state the opinion Dr. Walker and myself have formed regarding the value of tuberculin, and it is:—

1. That fresh tuberculin, when used with care and under proper conditions, although not infallible, is a valuable diagnostic of tuberculosis in cattle.
2. That tuberculin must be fresh, and that it loses its virulency when kept.
3. That when the disease is extensive, and the animal old and more or less emaciated, tuberculin does not cause a rise of temperature (in a few cases the temperature actually falls), and is therefore not reliable.

THE PREVENTION OF TUBERCULOSIS.

BY JAMES LAITHWOOD, F.R.C.V.S., CHIEF VETERINARY INSPECTOR FOR CHESHIRE.

In putting before you this paper, I feel quite cognisant of the fact that I have but little to say that most of you have not already heard, but I feel it to be my duty to continue to do what little I am able to assist in the proclamation of war which has been declared against this terrible disease—tuberculosis.

Much is being done that is commendable all over the country by the medical profession and others in the direction of sanitoria for the open air treatment of the diseased; but how little is being done that is creditable by our Government in the shape of prevention, which to my mind is of the greatest importance in a disease which kills one-eighth of the human race, and affects one-fourth of its cattle!

The State of Denmark, the greatest and most successful of dairy countries, has, much to its credit, for years assisted in the prevention of the disease, and gives compensation in full for all cattle that are in an advanced stage of the disease.

In America no less than 19 States have laws relating to the prevention of the sale of tuberculous food products, and the "Live Stock Sanitary Board of Pennsylvania" has caused the destruction of over 3,000 tuberculous cattle in two years, the number affected of which have fallen from 30 to 10 per cent. At first the farmers were opposed to the measure, but they are now unanimous in its favour. What, then, must we ask our Government to do? One of the greatest items in the prevention of consumption in the human being is to clear our bovine herds, our milk producers, of the disease.

Sir Richard Thorne says that milk from tuberculous udders is clearly responsible for the increased mortality in infants under one year of age. The infant mortality for the Michaelmas quarter in our towns was the highest on record, and chiefly from tubercular diseases.

The late Professor Kanthack found that out of 16 dairies examined nine contained tuberculous bacilli.

Professor Delépine found after examining 282 samples of milk that one-sixth contained germs that might at any time begin their work of destruction.

Professor Virchow, at the recent international congress at Berlin, said: "A single cow could depopulate a whole village, and the only radical cure was to kill the infected animal, as sterilizing the milk was by no means an absolute protection." Every royal commission, every congress, and every scientific authority in every country has testified to the great danger of tuberculous milk, and the need for State control in its production.

The first thing, then, to do is to include the disease in the Contagious Diseases (Animals) Act. The intelligent public seem now prepared for some definite methods of prevention, and it is an accepted fact that contagious diseases are capable of efficient control only unless they are taken in hand by the central authority.

The next item is the detection of the disease, the difficulty of which was the chief excuse why it was not included in the "Diseases of Animals" Act years ago. Now the tuberculin test is altogether beyond the experimental stage, and is recognised by all authorities as a most reliable diagnostic agent. In my own experience, after testing nearly 1,600 cattle, I have come to the conclusion that 95 per cent. of reacting animals are tuberculous, and 98 per cent. of non-reacting animals are healthy. That from the above-mentioned number tested, 36 per cent. were affected with tubercle, which will about represent the condition of the ordinary dairy cattle of Cheshire. After six months I have again tested a number of non-reacting animals, and have found that 12 per cent. of the same have reacted, which proves the absolute necessity for very thorough disinfection of the houses, this number having probably obtained the disease from contagion left in the cowhouse by the affected animals before their removal.

The use, then, of tuberculin should be encouraged by the Government, as it is in Denmark, by supplying it free of cost, and also the veterinary surgeon's fee for testing, on certain conditions, viz.: That he, the owner, will undertake to separate the healthy from the diseased, the latter to be made fat as soon as possible and sent to the butcher, and thorough disinfection of the cowhouses after removal of diseased. Every animal in an advanced stage, or having a tuberculous udder, or giving milk containing tuberculous bacilli, should be at once slaughtered, and compensation paid in full value. Pedigree should be in no way considered; for what is the honest and true value of a bull or cow, even if well bred, whose organs are covered with tubercle?

The amount required for compensation has been tremendously overestimated, has done much mischief, and probably caused many deaths through being a great cause in the delay of reasonable legislation.

Only 3 per cent. of tuberculous cows have tuberculous udders, and only 7 per cent. of tuberculous animals are condemned as unfit for food.

If, then, we consider the number of cattle in Great Britain in milk and in calf to be about 2,500,000, and the number of tuberculous animals, taking the whole country, to be 25 per cent., we get 625,000 cattle to be more or less diseased, and as we find only 7 per cent. of these animals are condemned as unfit for food, we have only 43,750 to be compensated for in full. If, then, we consider these to average £10 per head, which is the outside value, many being worth only £2 or £3, it follows that £437,000 is something like the amount required under the above conditions. But as it is probable not more than half of the stockowners would avail themselves of the use of the test during the first year, and as one-quarter will, before the Board of Agriculture do anything in the matter, have had their herds tested, it will be seen that only

£164,000 would be paid the first year, the same amount the second year, after which the amount each year would decline one-quarter or more, as very few reacting animals would be kept long enough to be clinically affected. Comparisons are odious; but compare, gentlemen, this paltry sum with the £500,000 which the Board of Agriculture have already spent on swine fever, and again compare the results. In the former it would admittedly lessen the greatest source of death to the human race, and also remove a source of contagion and yearly loss from our herds of greater importance than swine fever, while in the latter the spending of the £500,000 has not saved the life of a single human being. What is equity for one surely ought to be for the other.

No government being in earnest in its endeavours for the good of its people can decline to take up the control and prevention of the pitiable and lingering yearly deaths of 70,000 of its population. Surely it is not British to shrink from this foe, which is admittedly the most deadly enemy of our race.

Professor McFadyean says: "The public have surely a right to demand that if there are any reasonable measures by which this danger can be averted or minimised they ought to be put in force without delay."

Though disinfection is very essential and as much air and sunshine as possible should be admitted into the cowhouses, a sufficiency of air space and ventilation should be made compulsory, with a minimum of 400 feet per cow, with 500 feet to new buildings and 800 feet in towns, or, better still, their entire removal into the country.

The time will come when veterinary surgeons must be appointed to exercise functions co-ordinate with those of the medical officer of health for each city, borough or county, whose duty it will be to supervise the health and sanitary condition of all cattle within their jurisdiction.

In this respect Italy has set a most excellent example.

We ought to have regular and thorough compulsory inspection of all dairies supplying milk for human consumption.

The recent order of the Local Government Board and powers asked for by various corporations are small steps in a right direction, but a serious mistake appears prevalent in many quarters, viz., that the milk of a cow having no appearance of a diseased udder is perfectly safe for human consumption, but I have had experience that such is not the case. In the experiments which I was permitted to carry out for the County Council of Cheshire (a full report of which will probably be published shortly) a sample of milk from every cow that reacted to the tuberculin test was forwarded in a sterilized bottle to Professor Delépine for microscopical and also inoculation test, and in one case only, No. 24, a healthy looking animal, he found numerous tuberculous bacilli microscopically, and the inoculation experiments caused the death of the animal. On examination of the udder of this cow, I could not detect the slightest deviation from normal condition, every portion being perfectly soft and natural; I was also able to have three other veterinary surgeons and a medical officer of health, who made a careful examination of the udder when alive, and also a post-mortem, all of whom assented that they would pass it as a sound udder. It was then sent to Professor Delépine, who was again able to demonstrate the presence of bacilli, and the undoubted infectivity of the milk. On the other hand, No. 22, another cow that reacted, had two very suspicious nodules in the udder, one about the size of a hen's egg and the other half the size, hard and non-painful, which appeared to cause no inconvenience. On *post-mortem*, both were simply hydatid cysts.

Of course, the gradual growth and non-inflammatory characterof tuberculous mammitis differs much from the sudden attack of inflammatory mammitis, but I maintain that the examination of the udder by manual manipulation only is utterly useless and misleading, if done for the purpose of detecting tuberculous udders. The only reliable method is the tuberculin

test, and to allow no reacting animal to supply milk for human consumption, whether or not her udder appears healthy.

Much to be deplored and condemned is the action of some retailers of milk whose declaration of freedom from tuberculous bacilli in their milk is based on an examination which consisted of simply walking through the byres; such frauds can only redound to the discredit and ridicule of the perpetrators.

To summarise, then, the legislation required is :—

I. Tuberculosis should be scheduled in the Contagious Diseases (Animals) Act.

II. Gratuitous testing of cattle under the conditions mentioned, and compulsory testing of all young stock before parturition.

III. Compulsory notification of diseased udders and clinically affected animals.

IV. Compensation in full for visibly diseased animals, or any giving tuberculous milk. No compensation given unless owner has had possession over a certain period.

V. It shall be unlawful to sell, offer, or expose for sale, milk with any representation of purity unless the seller can produce a certificate from a M.R.C.V.S. that the animals which produced it have passed within six (or 12) months the tuberculin test.

VI. Sterilization of all imported milk at the port of landing, at the cost of the importer.

VII. The use of tuberculin to be restricted to reliable veterinary surgeons only.

VIII. All cowhouses and cattle producing milk for human consumption should be under uniform official veterinary supervision as to health, cleanliness, and sanitary conditions.

The voluntary method advised by some is a myth and a delusion. It will lessen the danger but slightly, and exterminate it never.

Some variation, and probably considerable additions, may be made to the above suggestions with benefit, which, if honestly carried out and combined with the valuable work of the medical profession, I, in descending to prophecy, venture to say that in 20 years' time the numerous sanitoria that are about to be erected will not be inhabited by tuberculous subjects, and the combined efforts of the medical and veterinary professions will not have been in vain.

ARKANSAS AGRICULTURAL EXPERIMENT STATION, JUNE, 1899.

The Relative Virulence for the Domestic Animals of Human and Bovine Tubercle.

BY ROBERT R. DINWIDDIE, M.D.

Part I.—Bibliographical Review.

(*Continued from p.* 390.)

THE author then proceeds to review the results of many investigators, whose experiments were made to establish or otherwise the identity of human and bovine tuberculosis.

The more important of these were those of Frothingham, who in 1897 made a number of tests of the action of cultures of human tubercle bacilli and of sputum of phthisis on calves. With cultures four calves from three weeks to three months old were injected, two in the abdominal cavity and two in the trachea. After five weeks all gave a tuberculous reaction to tuberculin. Of those inoculated in the abdominal cavity, one, killed at the end of six weeks, showed several pea-sized nodules on the stomach, intestines, and mesentery, and a number of minute nodules on the parietal surface of the peritoneum and surface of spleen; the other (after five months) showed numerous

nodules, mostly minute, scattered over the omentum, and caseous tubercles in the mesenteric glands. One calf inoculated in the trachea and examined after five months was found free from all tubercular lesions; the other showed local lesions and several small tubercles in the lungs and beneath the capsule of the liver.

Of the sputum tests one calf inoculated subcutaneously presented no changes referable to the inoculation; two others receiving the injection into the trachea showed a local development of tubercles and caseous masses outside the trachea with in one case slight superficial lesions in the liver of doubtfully tubercular nature.

The author concludes "that calves are apparently not particularly susceptible to the human tubercle bacillus."

Th. Smith (1896), on comparing cultures of tubercle bacilli obtained from man and from cattle, observed morphological and cultural differences which were constant in sub-cultures kept under the same conditions. The cultures of bovine origin possessed greater pathogenic activity than those from man for both guinea-pigs and rabbits. Two cattle, one year, and two and a half years old, inoculated in the lung with a culture of human origin, were found free from tubercular changes when killed three months, and 54 days respectively, after inoculation. Another, two and a half years old, similarly inoculated with a culture of bovine tubercle bacilli, died in five weeks of acute tuberculosis. Besides extensive disease of the thoracic cavits, tubercles were present in the kidneys and liver, and necrotic foci in all the lymphatic glands.

A repetition of these tests on a larger scale was made in 1897, 10 cattle being inoculated with as many different cultures of tubercle bacilli, half of human and half of bovine origin. Adult cattle, in general, were employed, and the injections made in the lung. The report gives a detailed description of the *post-mortem* findings in each case. A comparative study of the histological structure of the lesions induced by the human and bovine bacilli was also made. The results were similar to those obtained in his previous experiment, and indicate a much greater susceptibility of cattle for bovine tubercle bacilli in artificial cultures than for those of human origin. The lesions produced by the inoculation of human tubercle bacilli consisted in an abscess at the place of inoculation in the lung, in the pleura of the same side a formation of vascular fringes and flattened pedunculated masses histologically unlike tubercles. The inoculation of bovine tubercle bacilli produced disseminated tuberculosis of the lungs, pericardium, diaphragm, and ribs, and involvement of the lymph glands of the thorax; in a few cases slight tuberculosis of the abdominal organs.

The number of cultures and animals employed in these experiments, and the fact that all the details necessary for making the test a comparative one were carefully attended to, seem to justify the conclusion that the human and bovine bacilli in general represent races of unequal pathogenic activity for cattle. On the practical question of the inter-transmission of the human and bovine disease, the author thinks it improbable that under natural conditions cattle can become infected by human tubercular sputum, whilst on the other hand, "accepting the clinical evidence on hand, bovine tuberculosis may be transmitted to children when the body is overpowered by large numbers of bacilli, as in udder tuberculosis, or when certain unknown favourable conditions exist."

This article gives a review of an experiment by Sidney Martin (Rep. Roy. Com. on Tuberculosis, 1895, Appendix, p. 18), of which I have seen nothing elsewhere. Four calves fed once with bovine tubercle in large quantity gave positive results with lesions, involving the lungs and pleura, as well as the intestine and mesenteric glands. In six others fed once with sputa of man,

also in large amount, nodules of the intestine were present in four, of which one also showed infection of the mesenteric glands. Two were free from lesions.

The conclusion arrived at was that sputum was less infective for calves than bovine tubercle.

The foregoing review does not include all the tests which have been made in transmitting tuberculosis to the domesticated animals.

Wesener, in a critical review of the experiments on ingestion tuberculosis made up to that time (1885), gives a summary from which the following may be extracted as bearing on our subject: Of the animals (71) on which feeding experiments with human tubercular material were undertaken, guinea-pigs and swine were most easily infected. On cattle the effects could hardly be estimated, as only two tests were made—one with positive, the other with negative, results.*

Sheep became infected in half the cases ;† dogs very rarely.

Of the cases (180) in which feeding tests of animal tuberculosis (chiefly bovine) were made, calves, goats and sheep showed the greatest susceptibility—a positive result in about three-fourths of the cases ; pigs in two-fifths ; cats in over, and dogs under, one-third. On account of the varying number of the animals of the different species used, very much importance cannot be attached to these figures as showing the comparative susceptibility of animals towards human and bovine tubercle.

The attempt to summarise the facts reported in the foregoing review, and to deduce conclusions therefrom, is perhaps best postponed until after the description of my own experiments, which forms the subject of the second part of this paper.

Part II.—Experimental Researches.

Since the introduction of tuberculin as a diagnostic agent in tuberculosis of cattle, and the consequent discovery of the general occurrence of this disease in many of the finest and most highly-prized herds where it hitherto had not been suspected, the methods by which it may be combated have received considerable attention and discussion. The "stamping out" process, one feature of which requires the slaughter of all infected animals, has been voluntarily employed in individual cases with the result, sometimes, of not only stamping out the disease, but practically extinguishing the herd as well. As a compulsory measure of general application, an objection to its employment has been found in the enormous expense required for its execution, and, further, in the uncertainty as to the results. One element of uncertainty is presented by our limited knowledge, other than speculative, of the relation between the human and the bovine disease.

Before beginning my experiments in 1896, I was surprised, in looking over the literature of tuberculosis for evidence of the transmissibility of the disease from man to cattle, to find a total absence of any experiments or observations on this point in the reference works at my command. From the time of Koch's discovery of tubercle bacilli practically nothing had, in fact, been done to elucidate this point. That discovery seemed to have been accepted by pathologists as establishing the complete identity and, therefore, transferability of the disease in man and animals. The literature previous to that date, however, as may be seen in the preceding review, contains the records of many experiments bearing on this question. In the last two years, also, several important contributions have been made, notably by Smith and Frothingham.

*Wesener's review does not include the feeding experiments of Chauveau made before that time but not fully published till 1891.

†The tests on swine and on sheep (as well as on cattle) were too few to furnish reliable data for any opinion.

My own experiments were begun by testing the susceptibility of cattle towards human sputa, with the aim of arriving at some opinion as to their liability to suffer from a spontaneous or natural infection of this kind. The results of these first attempts were so inconclusive that the work was continued later and extended to include comparative tests with bovine tubercular material also. In a few instances cultures of tubercle bacilli were employed. The animals on which the tests have been made include 20 calves, 16 pigs, two sheep, and 16 chickens, guinea-pigs and rabbits being also incidentally employed. In the case of five of these animals (calves) a partial record only is given, the experiment being still incomplete. In all cases the experimental animals were kept in rather large pens. A covered shed open at the sides was the only shelter they received, hence the influence of stabling, with its constant attendant, defective ventilation, is excluded. On the other hand, some of the animals were exposed to the depressing influence of extreme winter weather. They were all liberally fed. The various pens were separated from each other by a space of about 12 feet, and each supplied with independent drinking troughs.

Feeding experiments with tuberculous human sputa.—This material was obtained in considerable amounts from a hospital for consumptives, and hence was usually the mixed products from many patients, and from two to three days old when received. A relatively small quantity was received from other sources and used while still fresh. The presence of tubercle bacilli was verified in all samples before being fed, and in a few cases in which putridity was somewhat advanced the material was further tested by the inoculation of guinea pigs. These inoculations never failed to produce the usual result—a generalised tuberculosis—and hence need not be further referred to. In order to approximate more closely to the conditions of a natural infection the plan was adopted of feeding the material in small doses frequently repeated. It is possible that this may have influenced the result. In the experiments of the same kind by others it is noticed that the opposite plan was usually pursued, namely, administering the material on one or two occasions only, and in larger quantity than I used.

The animals employed in this first experiment were four cattle, six pigs, and six chickens.

The cattle consisted of two calves, each two months old, in one pen, and two larger animals, nearly two years old, in another. It was the original intention to make on these older cattle tests of inhalation of dried and pulverised sputa, but this plan proved to be impracticable under the circumstances. They were fed, however, in a slightly different way from the other two. To the latter the sputum was given well mixed in milk during the first few weeks, after that in a mixture of milk and bran. The other lot got it in their feed boxes mixed with dry bran, a method which, from the drying of part of the sputa in the boxes, doubtless made the test to a certain extent one of inhalation as well as ingestion. All the cattle came from the same farm. A preliminary tuberculin test made on one of them proved negative.

The notes of these experiments show that altogether 526 C. C. of sputa were fed to these four cattle in 24 doses, the minimum at one feeding being 10 C. C., the maximum 60 C. C., and that the period of feeding extended through three months, August, September, and October, 1896. Fourteen samples of sputa were used, most of these being, as above stated, mixed samples—that is, not from one individual only. Tubercle bacilli were present in all, and usually numerous. On December 29 all were tested with tuberculin and failed to give any reaction indicative of infection. The two older animals (A and B) were again tested March 11, 1897, with negative results. All were killed on March 18, about eight months from the beginning of the experiment, and proved to be entirely free from tubercular lesions.

The six pigs of this experiment were about six weeks old, and received the sputa to the amount of 150 C. C. well mixed in milk. It was given in 20 doses from July 7 to October 7, 1896. The pigs were killed in May of the following year (1897), about 10 months after the experiment began. The examination revealed slight lesions of tuberculosis in two animals only. In one of these there was enlargement and caseation of the submaxillary lymph glands, and a few of the mesenteric glands contained purulent foci. In these lesions tubercle bacilli were present in small numbers. The other showed enlargement of the submaxillary lymph gland of one side with formation of small pockets containing thick calcareous pus. Sections of this gland showed tubercle bacilli numerously present in the walls of these cavities.

The other four pigs were free from all tubercular disease.

The chickens subjected to this feeding test were six in number and about three months old. They received a total of 150 C. C. sputa in their food in nine doses during October, 1896. Killed December 21, none of these showed tubercular disease.

Tests of inoculation of human and bovine tubercle in parallel series were made on eight calves and four pigs. The inoculations were made in the peritoneal cavity in all of these animals, but two calves had previously received an injection in the trachea. There were used for these inoculations, four samples each of human and bovine tubercular material, one calf being inoculated from each specimen. The tests being intended as comparative ones may be most suitably described so as to illustrate this point, that is, as four separate experiments, although in the matter of dates the comparison is not always exact. The tubercular material of human origin was in each case the expectoration of pulmonary tuberculosis; that of bovine origin the nearest obtainable analogue to this—namely, the caseous degenerated material of tuberculous lungs or lymph glands of the thoracic cavity, which, for convenience, is designated "Bovine Virus" I., II., etc.

The author then gives the details of his various experiments, with views of tuberculosis obtained from various sources.

In presenting in a condensed form the results of the foregoing experiments, each animal species may be most suitably considered separately.

Cattle.

Feeding Tests with Tubercular Sputa of Man.—Of four calves subjected to this test all failed to give a tuberculin reaction, and, according to the *post-mortem* examination, all remained absolutely uninfected. (This test is not comparative, as no similar experiments with bovine tubercle were undertaken.)

Inoculation of Sputum and Bovine Tubercular Material.—Intra-tracheal inoculation was tested on two calves. The sputum injected calf alone responded to the tuberculin test. The changes found on *post-mortem* were in both cases slight roughened patches on the pleura, without visible evidence of any tubercular process; in the sputum test no local lesion, in the other a number of abscesses in which tubercle bacilli were found.

Intra-Peritoneal Inoculation. (Four calves in each series).—Of the sputum series, two gave doubtful and two negative reactions to tuberculin; of the bovine series, two positive and two negative. The pathological changes in the sputum lot were: In one, no lesions; in another a few roughened patches and seed-like granules on the omentum with slight fringe formation on various parts of the abdominal serosa; a few whitish spots on surface of liver. The fourth was not examined *post-mortem.*

The bovine series showed: In one, no lesions; in two, changes similar to the above, but somewhat more extensive; in the fourth a very extensive development of grape-like growths containing tubercles all over the peritoneum, a few of same on thoracic surface of diaphragm, tuberculosis of some of the abdominal lymph glands.

Comparative Tests with Sputum and Bovine Cultures. (Intra-tracheal inoculation on two calves.)—The sputum-tested animal gave no reaction to tuberculin. The *post-mortem* findings were slight pleuritic adhesions, fringe development on costal pleura, a few lymphoid nodules the size of millet seed histologically showing no relation to tubercles in lungs. Bovine culture: Locally, a number of abscesses external to trachea and fungus-like ulcerating growths on its mucous surface, all containing tubercle bacilli, lower cervical lymph nodes tubercular.

Intra-Peritoneal Inoculation.—Two calves. Sputum culture: Reaction to tuberculin. On omentum are several patches studded with millet-seed-like calcareous granules, and one small bean-size polypoid growth; a few mesenteric glands tubercular. Bovine culture: Fatal result in six weeks. Acute tubercular disease involving all the abdominal and thoracic organs; lesions in the form of millary tubercles, large yellow nodules and fibrous grape-like growths on serous surfaces; tubercle bacilli very abundant.

Inoculation in Lung.—Two calves. Sputum culture. No tuberculin reaction; no *post-mortem.* Bovine culture: Tuberculin reaction; abscess with surrounding consolidation and tubercles in lung; numerous tubercles in pleura; fringe formation; tuberculous bronchial glands.

Feeding.—Two calves. Sputum culture: No reaction to tuberculin; no *post-mortem.* Bovine culture: Reaction to tuberculin; mesenteric glands tubercular; many yellow spots on liver.

Pigs.

Feeding Sputa to six pigs resulted in infection in two, the disease being confined to the submaxillary and mesenteric glands.

Intra-Peritoneal Inoculation of Sputa and Bovine Tubercular Material.—Four pigs. Sputum lot: One died from other disease before effects could be produced. The other shows a short lesion, a general tuberculosis of abdominal serosa, tuberculous abdominal and thoracic lymph glands, and embolic tubercles in lungs. Bovine lot: Both presented essentially the same condition as the last described, in the abdominal cavity, but no extension to thorax.

Intra-Peritoneal Inoculation of Cultures.—Two pigs. Sputum culture: No lesions. Bovine culture: In one generalized; in the other localized in submaxillary and mesenteric glands.

Sheep.

Intra-Abdominal Inoculation of Cultures.—Two sheep. Sputum culture: Patch of seed-like granules on omentum. Bovine culture: Generalized disease ending fatally.

Chickens.

Feeding Sputa.—Six chickens. All unaffected.

Intra-Abdominal Inoculation of Sputum and Bovine Cultures.—Ten chickens. Both lots were unaffected.

Communications, Books, Journals, etc., Received.

Veterinarian; Record; Bulletin of The John Hopkins Hospital; The Journal of Comparative Medicine and Veterinary Archives; The Scottish Medical and Surgical Journal; American Veterinary Review; The Public Health Journal; The Journal of the Jamaica Agricultural Society; Queensland Agricultural Gazette; Petersburg Veterinary Society's Journal; Revista Veterinaria (Vitoria); La Riforma Veterinaria (Naples); Recueil de Médecine Vétérinaire (Alfort); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Berliner Thierärztliche Wochenschrift (Berlin); Deutsche Thierärtzliche Wochenschrift (Hannover and Karlsruhe); La Clinica Veterinaria (Milan); La Revista Veterinaria (Buenos Aires); Agricultural Journal (Cape Town); Bulletin de la Société des Sciences (Bucarest).